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Psychology of humor

Willibald Ruch

Introduction

Psychology is about people. Hence the psychology of humor refers to the study of humor and people, not humor of humorous material only. We don't consider psychology to be the science of the psyche or soul, as those latter terms are rather vague. Definitions these days typically refer to psychology as being the science of the behavior of living organisms, its causes and consequences. Behavior refers to activities and processes that can be objectively assessed and recorded. They may be visible externally (like walking, or talking), or via a recording device (such as the action of a particular muscle). Behavior may also refer to internal processes and what the mind does, like sensations, perceptions, memories, thoughts, dreams, motives, emotional feelings, and other subjective experiences. Causes of behavior may be internal (like personality) or external (like the social situation), and so may be the consequences. Psychology wants to describe (e.g., how is it?), explain (e.g., why do we do it?), predict (e.g., who will do it?) and control (e.g., can we change it?) behavior.

For a psychology of humor then we need to be precise in *describing* the behaviors and phenomena involved, like the cognitive processes involved in the creation of a funny remark, or the many levels of the emotional response to a brilliant joke. When *explaining* humor behavior we ideally want to arrive at laws, such as "perceived funniness of a joke varies in an inverted u-form as a function of the degree of incongruity", and when we study whether extraverted individuals smile more at a clowning experimenter than introverts we *predict* humor. When we ultimately are able to make humorless people funny entertainers, or turn sarcastic types into benevolent whimsical jesters, we have ultimate proof that we *control* humor behavior.

Psychology has its roots in both philosophy and physiology and intersects with, or is informed by many other academic disciplines. Not surprisingly, early psychological studies were in the tradition of either two. Following the early accounts of laughter by Darwin (1872) and Spencer (1860), the empirical study of various physiological components of laughter, like respiration,

vocalization, pupil dilation, or heart rate was undertaken (Boeke 1899; Feleky 1916; Hecker 1873; Heitler 1904; Raulin 1900; Schirmer 1903) as well as the first observations of pathological and drug-induced laughter and possible neurophysiological correlates were made (Brown 1915; James 1882; Meunier 1909; von Bechterew 1894).

The influence of philosophy was most visible and lasting through its sub-field of aesthetics, which addressed not only qualia like beauty, harmony tragedy, but also the “comic”. The first empirical studies of the “comic” by psychologists, like Hall and Allin (1897), Heymans (1896), Hollingworth (1911), Kraepelin (1885), Lipps (1898), and Martin (1905) continued in this tradition albeit aimed at providing experimental evidence for early theories and notions. Experimental aesthetics (see Berlyne 1974; Ruch and Hehl 2007) would indeed be one natural home for the psychological study of humor if we had not merged into an interdisciplinary field. Readers of other disciplines, however, should note that as a science, psychology endeavors to answer questions through the systematic collection and logical analysis of objectively observable data. An empirical study typically utilizes a sophisticated methodology, e.g., carefully thought out experimental designs, psychometrically sound assessment tools, and statistical treatment of the data collected. Those and related features separate scientific articles from pop psychology books and essays.

Psychology has always been one of the disciplines contributing most to the knowledge on humor. However, research in humor and laughter, like in other positive phenomena, surprisingly, has been peripheral in psychology during the 20th century. Not only were relatively few studies dedicated to humor (compared to anger, anxiety or depression), but also interest in psychology came in waves, each of which had a different focus. For example, while the rediscovery of humor as a research topic in the 1970 had a strong experimental, developmental, and cognitive focus, the research starting in the mid 80-ies was directed more towards personality, and applied issues like health and therapy. However, we can't say that the basic issues addressed in the 1970s are solved by now and we are on safe grounds when having progressed to the application of humor. Luckily, a recent textbook summarized most of the pertinent literature including the more historical ones (Martin 2007a). Nevertheless, readers are advised to study the anthologies and journal articles of those times, as not all knowledge from that time is preserved in recent books. Books like the ones by Goldstein and McGhee (1972), McGhee (1979), Chapman and Foot (1976, 1977), McGhee and Goldstein (1983a, 1983b) can be considered to be classics and up to date in some respect. Also,

it should be considered that excellent research on humor is done outside of the humor research community from people using other umbrella terms, like amusement, facial expression etc.

However, the times of humor research being on the edge of psychology might change drastically as positive psychology (see Seligman and Csikszentmihalyi 2000) has discovered humor (and playfulness) as one of the core character strengths (Peterson and Seligman 2004) contributing to the good life. The focus on positive traits led to a classification of character strength and virtues. The *Values in Action (VIA) Classification of Strengths* is intended to be psychology's *Diagnostic and Statistical Manual* (DSM, American Psychiatric Association 1994). It is aimed at achieving a similar goal to what the DSM does for psychiatry (i.e., understanding, treating, and preventing psychological disorders), but only for positive traits. It will provide an international frame of reference for the definition of character and its assessment across the lifespan. It also forms the basis for designing and evaluating interventions that bring about individual character strength. This has been the research agenda for humor already for a while, and thus humor research forms a solid column of positive psychology, and humor research will also profit from looking at progress achieved in other areas of positive psychology.

Nevertheless, all subfields of psychology seem to contribute to the understanding of humor and laughter. In fact, humor can be studied in relation to cognition, motivation, and emotion. There are individual differences in humor that maybe habitual or transient, and there is a development across the life span. Changes in humor may be brought experimentally and by systematic training. There are genetic and environmental factors. Humor contributes to emotional health, and is important in learning and social relationships. Thus, humor is an important domain of human functioning and gets attention from both basic research as well as the applied fields.

Literature review

The following review will group the literature around some basic issues relating to the structure and dynamics of humor. As psychology is concerned with people, the view onto humor will be made from the individual's perspective; e.g., the phenomena associated with responding to or creating humor and not a description of humor itself. It is not aimed to give a full account of the psychological literature, which is not possible given the space constrictions. Rather sources will be mentioned where further information can be looked up

if needed. For a fuller account of the literature the reader is referred to other sources (e.g., Martin 2007a; Roedelein 2002).

The “this is funny” perception

The core of the experience of humor is the perception that something is “funny,” and indeed ratings of degree of funniness are the most frequently used assessment tool in experimental research on humor.

Although the perception that something is *funny* (i.e., the “humor response”, an expression coined by McGhee 1971) is a unique experiential quality, it is not a primary quality of one single stimulus that we perceive directly (like warmth) but it involves a comparison. Typically we experience an incongruity between objects, between elements of an object, or between an event and an expectation. Perceiving such stimuli properties may cause us to engage in playful processing of incongruity and we feel the “lightness” involved in amusement (Lyman and Waters 1986). However, the second meanings of the terms (e.g., funny, comical) are also referring to the unusual (e.g. *peculiar*, *strange*, or *odd*) as well as to the suspicious (“There was something funny about these extra charges”) reminding us that not all incongruities are perceived as non-serious or not consequential. In humor the information we perceive is not really important and does not require an immediate and appropriate response: we know this is play, a play with ideas. There is no need to upgrade our knowledge system as the information we received only has an “as if”-truth; it is playing with sense and nonsense (Ruch 2001).

The nature and intensity of the subjective experience is most frequently measured via a 7-point Likert scale ranging from not at all funny (= 1) to extremely funny (= 7). Studies show that positive responses of different qualities (humorous, witty, amusing) do overlap, but they are independent of negative evaluations (Ruch and Rath 1993). It should be mentioned that “funniness” ratings typically are prone to produce skewed distributions. Most individuals do find a given stimulus not funny, and typically there are always individuals finding the poorest joke maximally funny (Ruch and Hehl 2007).

However, the analysis of the “funny” and its relation to related qualities is also one of the most neglected aspects of psychological humor research. In research we commonly assume that there is only one experiential quality that humor evokes, namely funniness, albeit to a different degree. This position does neglect the fact that in most languages we do have different terms to refer to humorous stimuli and events, such as *witty*, *humorous*, *comical*,

hilarious, or *droll*. Humor also seems to have different “flavors”, such as *bitter*, *salty* or *dark*. Depending on how narrow or broad we define the realm of humor (see below) we also do have phenomena like irony, satire, sarcasm, or mock/ridicule. While those may well be perceived as *funny*, it is questionable that the sole rating of degree of funniness fully represents the experiential world of the receiver. In other words, do ratings of *ironic* and *sarcastic* covary with judgments of *funny* in irony and sarcasm, respectively? A factor analysis of 23 qualities (e.g., funny, droll, bizarre, macabre, absurd, subtle) used to judge 60 jokes and cartoons yielded a two-dimensional space (Samson and Ruch 2005). One dimension was more cognitive (subtle, ingenious vs. odd, bizarre) and referred to more structural features of jokes and the other referred more to motivational qualities (stinging, macabre vs. droll, touching) presumable reflecting the impact of the content of jokes and cartoons. Nevertheless, all 23 terms assumed unique places in that space suggesting that they all measured different aspects. The perception of “funniness” was located exactly in the diagonal (subtle high, droll high) suggesting that both dimensions contributed equally to this perception.

Smiling

Smiling is the most frequent response to jokes. A review of studies reveals that in experiments smiling occurs roughly five times more often than laughter (Ruch 1990). However, “smiling” is a misleading category as there might be about 20 types of smiles that can be distinguished on an anatomical basis (Bänninger-Huber 1996; Ekman 1985). For example, there are five facial muscles that are able to create an upward move of the lip corners (i.e., the zygomatic major, zygomatic minor, levator anguli oris, buccinator, and risorius muscles) but only one of them, the zygomatic major muscle, is involved in the smile of enjoyment.

When individuals genuinely enjoy humor they show the facial configuration named (Ekman, Davidson, and Friesen 1990) the *Duchenne display* (to honor Duchenne who first described how this pattern distinguished enjoyment smiles from other kinds of smiling). The *Duchenne display* refers to the joint contraction of the *zygomatic major* and *orbicularis oculi* muscles (pulling the lip corners backwards and upwards and raising the cheeks causing eye wrinkles, respectively). Typically there is a harmonic time course in the action of both muscles across onset, apex, and offset, and the contraction is symmetric and is in the time span between one half and 4 to 5 seconds

(Ekman 2005; Frank and Ekman 1993; Ruch 1990). Smiles not following those definitions are unlikely to reflect genuine enjoyment of humor.

This does not exhaust the number of types of smiles as there may be smiling involved in blends of emotions (e.g., when enjoying a disgusting or frightening film), smiles masking negative emotions (e.g., pretending enjoyment when actually sadness or anger is felt), miserable, flirting, sadistic, embarrassment, compliance, coordination, contempt, and phony etc. smiles (see Ekman 1985; Bänninger-Huber 1996). In humor experiments unilateral contractions of the *buccinator* muscle (i.e., the smile of contempt) often goes along with finding the jokes distasteful (Ruch 1990, 1997; Ruch and Rath 1993).

While the expression of smiling is innate we have learned when and to who show or not show enjoyment, and with what intensity. Also in experiments the social situations may activate those display rules, which might alter our facial actions. Scholars of humor should therefore look at facial signs of the attempt to dampen, control, or suppress smiling, as those are of significance (e.g., Ekman and Rosenberg 2005; Keltner 2005). When the experimenter or a companion is present, *phony smiles* may occur. Phony smiles try to convince somebody that one enjoys humor when actually nothing much is felt. These are deliberate (voluntary, contrived) contractions of the *zygomatic* major muscles (that might be unilateral, outside the time limits given above, and most likely also not having a smooth ballistic movement). Most importantly, the eye region is not involved in this type of smiling. Deliberate facial actions probably have their origin in the motor strip of the neocortex, while spontaneous emotional movements originate in the subcortical motor centers (Wild, Rodden, Rapp, Erb, Grodd, and Ruch 2006).

Smiling (and the facial component of laughter) is best assessed with the help of the Facial Action Coding System (FACS; Ekman and Friesen 1978; Ekman, Friesen, and Hager 2002). FACS is a comprehensive, anatomically based system for measuring all visually discernible facial movement. It describes all visually distinguishable facial activity on the basis of 44 unique action units (AUs), as well as several categories of head and eye positions and movements. FACS coding procedures allow for coding of the intensity of each facial action on a 5-point intensity scale, for the timing of facial actions, and for the coding of facial expressions in terms of events. An event is the AU-based description of each facial expression, which may consist of a single AU or many AUs contracted as a single expression. FACS therefore allows for a comprehensive assessment of all facial events related to humor. Learning FACS takes approximately 100 hours or one week of inten-

sive training. Also applying FACS is time consuming, and less sophisticated systems, such as the MAX (Izard 1983) and the AFFEX (Izard, Dougherty, and Hembree 1983) exist, which require less time to score. Applications of FACS to humor and the measurement of smiling can be found in Ekman and Rosenberg (2005).

Laughter

Laughter is often seen as synonymous with humor. Our field was occasionally referred to as the realm of the *ridicula*, the laughable (objects), and titles of books or talks might be, e.g., “laughter in the medieval ages”, although then not actually laughter is studied but occasions for laughter. In psychology the two concepts are more carefully distinguished, as there is laughter without humor (e.g., social, embarrassed, or nervous laughter) and enjoyment of humor not always involves laughter (McGhee 1979), especially in experiments, when research participants are tested in solitude (Ruch 1990). Still the psychological study of humor includes the study of smiling and laughter for a myriad of reasons. Not only are they a good indicator of the intensity of the emotional response to humor (Ruch 1995), they also might mediate some of the effects of humor on health or other outcomes (Martin 2001; Rotton 2004).

Laughter is also not unambiguously defined in research articles and encyclopedias. Sometimes researchers refer only to the respiratory or vocal component of the expressive pattern (neglecting the face), sometimes they refer to the whole act or behavioral episode. In studies of primates laughter the face gets most attention (“relaxed open-mouth display”) and in everyday life a smiling face is often referred to as “laughter” although the vocal parts are missing. As a consequence of the lack of a comprehensive view on laughter, estimation of such basic parameters as duration yielded quite discrepant results. While studies of the face suggest a mean duration of laughter of about 4.5 seconds (Ruch 1990), acoustic studies of laughter yield a mean duration of 1.2 seconds. This is not surprising as the latter includes only the parts during which respiratory changes occur and they cover only a smaller portion of the entire response. Also, while a morphology-based taxonomy exists for smiling (Ekman 1985), nothing comparable has been achieved for the more complex behavior of laughter. While dictionaries distinguish between, for example, hearty and derisive laughter, or between a guffaw, chuckle or chortle, the separation is not done at an objective (e.g., physiological, muscular,

acoustic) basis so far. Huber, Drack and Ruch (in press) report of a pilot study with actors posing 23 putative categories of laughter. Decoder studies will show whether actors agree in their interpretation of the laughs, whether some types of laughs will yield different FACS-codes and whether naïve listeners will be able to identify the nature of the laughs. Acoustic analyses of laughter occasionally distinguish among types of laughs, such as laughter induced by tickling, mocking laughter, or hearty laughter (Habermann 1955; Szameitat 2007).

Already Darwin (1872) gave a comprehensive and in many ways remarkably accurate description of laughter in terms of respiration, vocalization, facial action and gesture and posture, which was updated, elaborated, or corrected in contemporary writings (Bachorowski, Smoski, and Owren 2001; Nwokah, Davies, Islam, Hsu, and Fogel 1993; Ruch 1993; Ruch and Ekman 2001; Szameitat 2007). He addressed the important issues. Thus, he noted that "... [t]he sound of laughter is produced by a deep inspiration followed by short, interrupted, spasmodic contraction of the chest, and especially of the diaphragm" (Darwin 1997 [1872]: 199). "A man smiles - and smiling, as we shall see, graduates into laughter." (Charles Darwin 1997 [1872]: 195). "A graduated series can be followed from violent to moderate laughter, to a broad smile, to a gentle smile, and to the expression of mere cheerfulness" (p. 206). "Between a gentle laugh and a broad smile there is hardly any difference except that in smiling no reiterated sound is uttered, though a single rather strong expiration, or slight noise - a rudiment of a laugh - may often be heard at the commencement of a smile" (p. 208). "During excessive laughter the whole body is often thrown backward and shakes, or is almost convulsed." (Darwin 1997 [1872]: 206–207).

Cognitive processes

Numerous theories have been proposed to explain the perceived funniness of humor, with cognitive approaches being the most prominent together with arousal and superiority theories (for a review of theories, see Keith-Spiegel 1972; Martin 2007a). Recently, cognitive theories have also been applied to the study of individual differences in humor but also neuropsychological processes.

Cognitive theories typically analyze the structural properties of humorous stimuli or the way they are processed; sometimes these two levels are also mixed up. Perhaps beginning with Aristotle, incongruity was considered to

be a necessary condition for humor (Deckers 1993). From this perspective, humor involves the bringing together of two normally disparate ideas, concepts, or situations in a surprising or unexpected manner. Koestler's (1964) term "bisociation" refers to the juxtaposition of two normally incongruous frames of reference, or the discovery of various similarities or analogies implicit in concepts normally considered remote from each other. Despite some critics (e.g., Ferroluzzi-Eichinger 1997; Latta 1999), there is widespread agreement that incongruity is a necessary condition for humor. However, it was occasionally argued that it is not a sufficient one. Sheer incongruity may also lead to puzzlement and even to aversive reactions (see Forabosco 1992). Therefore, such variables as the resolution of the incongruity (Suls 1972), appropriateness of the incongruity (Oring 1992, 2003), the acceptance of unresolvable incongruity, or the "safeness" of the context in which the incongruity is processed (Rothbart 1976) have been proposed. Rothbart and Pien (1977) emphasized the importance of the distinction between possible and impossible incongruities and between complete and incomplete resolutions. This is important, as only possible incongruities can be resolved completely while for an impossible incongruity only a partial resolution is possible, and a residue of incongruity is left.

The definitions of incongruity ("... a conflict between what is expected and what actually occurs in the joke") and resolution ("... second, more subtle aspect of jokes which renders incongruity meaningful or appropriate by resolving or explaining it" Shultz 1976, pp. 12–13) refer to the process already, and less to the material.

Linguists provide a precise description of what makes a text funny. Raskin (1985) presented in detail the first formal semantic theory of jokes, which – due to its reliance on the concept of "script" (a structured chunk of information about lexemes and/or parts of the world) – became known as the Semantic Script Theory of Humor (SSTH). The SSTH can be summarized as two necessary and sufficient conditions. A text is funny if and only if both of the two conditions obtain: (i) the text is compatible, fully or in part, with two distinct scripts; and (ii) the two distinct scripts are opposite (i.e., the negation of each other, if only for the purpose of a given text), following a list of basic oppositions, such as real/unreal, possible/impossible, etc. For example, Raskin's prototypical joke ("Is the doctor at home?" the patient asked in his bronchial whisper. "No," the doctor's young and pretty wife whispered in reply. "Come right in.") is compatible with the two scripts "doctor" and "lover" and the scripts are opposite on the sex vs. non-sex basis (for an elaborated interpretation see Raskin 1985).

How are jokes cognitively processed? Perhaps we need to distinguish three stages. Historically, often two stage models were described, however, referring to two distinct albeit different stages or recursive processes. For Kant (1790) laughter was "... an affection arising from the sudden transformation of a strained expectation into nothing". In other words, that which is originally perceived in one (often serious) sense is suddenly viewed from a totally different (usually implausible or ludicrous) perspective. Eysenck (1942) goes beyond disconfirmation of an expectation by positing that the incongruity needs to be reintegrated. For him (Eysenck 1942: 307) "... laughter results from the sudden, insightful integration of contradictory or incongruous ideas, attitudes, or sentiments which are experienced objectively." Suls (1972) introduced the perhaps best-known two-stage model. According to this model, the perceiver must proceed through two stages to find a joke or cartoon funny. In the first stage, "... the perceiver finds his expectation about the text disconfirmed by the ending of the joke ... In other words, the recipient encounters an incongruity – the punchline. In the second stage, the perceiver engages in a form of problem solving to find a cognitive rule which makes the punchline follow from the main part of the joke and reconciles the incongruous parts." (p. 82).

In the doctor's wife joke above, the ending ("come right in") is incongruous, as it does not readily follow the prior "no" (especially as it is not supplemented by a statement to the patient that he was welcome to wait for the doctor's return). Thus, it does not make sense for the doctor's wife to invite the apparent patient in. Herewith ends the incongruity stage. However, the hints *young* and *pretty* help the recipient to reinterpret the text along the lines that not the doctors' patient, but his wife's lover is knocking on the door, and suddenly the ending (including the wife's unexplained whispering) makes sense and follows from the joke body. These processes are part of the "resolution"-stage.

According to Suls's model there are two possible outcomes of the second stage, namely laughter (if the rule is found) or puzzlement (if the rule is not found). While the latter is plausible, the former has been doubted. Why should the resolution immediately lead to laughter? It was argued (Ruch 2001) that having borrowed the flow chart of a problem-solving computer program, this model could not go much beyond seeing humor as being a problem-solving activity. While the model described the comprehension part well, it does not explain appreciation (McGhee and Goldstein 1972). It is likely that the cognitive processes continue after resolving the incongruity. Unlike after real problem solving, the recipient is aware that the fit of the solution is a pseudo- or "as if"-fit.

This idea is part of a different two-stage model. Lipps noted already in 1898 that what makes sense for a moment is subsequently abandoned as not really making sense. Thus, the two stages he spoke about came later in the processing of humor (its is sense and no sense). At a meta-level we experience that we have been fooled; our ability to make sense, to solve problems, has been misused. Thus, in particular for the impossible incongruities and their partial resolution, the two-step (i.e., step I: detection of incongruity or violation of a build-up expectation; step II: resolution of incongruity) model needs to be expanded to include a third stage of detecting that what makes sense is actually nonsense. This third stage then allows distinguishing between joke processing and mere problem solving. If the processes indeed ended with the resolution of the incongruity, we would not be able to distinguish whether we just resolved a problem (as in riddles) or whether we processed humor. We would believe in the outcome of the problem-solving activity and assume that it has truth-value. In humor we do realize that the resolution only makes sense in the playful context. Thus, while Suls's incongruity-resolution model covers stages one and two, Lipps's distinction refers to stages two and three. Some authors postulated even further oscillations between the two interpretations of the text or two perspectives involved; like playing with sense and nonsense (for conflict or ambivalence theories, see Keith-Spiegel 1972).

One can argue that the problem-solving aspect in humor appreciation is peripheral. Indeed, Derks, Staley, and Haselton (2007) rightfully raised the question whether joke comprehension is so challenging that it has a problem-solving quality. Based on their results Derks et al. (2007) suggest that perceiving humor is more an automated expert-like behavior. Likewise, individual differences in humor appreciation do relate more strongly to *cognitive style* than to *ability* measures. However, fluid intelligence does predict finding nonsense humor funny, and also the "mastery" studies show inverted-u functions between children's development, complexity of jokes and appreciation (McGhee 1979). However, recent results indicate a negative (rather than an inverted-u) relation between funniness and difficulty (Cunningham and Derks 2005; Derks et al. 2007; Herzog, Harris, Kropscott, and Fuller 2006).

The importance of incongruity and resolution is underscored by experiments; for example, different versions of a joke are generated that do allow for incongruity or not, or for meaningful resolution or not. This was tested in children but also neurological patients (see reviews by Forabosco 1992, 2007; Suls 1983; Uekermann, Channon, and Daum 2007). However, the variation of the key ingredients (e.g., degree of incongruity, resolution, salience of contents) cannot be varied independently of each other by manipulating

a joke or cartoon. For example, making the punch line more incongruous may simultaneously mean to change its content or other properties. One way out is, for example, to leave the jokes intact, but undertake a differential priming of the two meanings of a key word in a joke (Wilson 1979), or a priming of the structure (Derks and Arora 1993) of the jokes to follow. Another possibility is the use of artificial humor stimuli. This may take, for example, the form of sequences of words deviating from proper grammatical sequences (Ehrenstein and Ertel 1978), adjective-noun pairs varying in semantic distance (Godkewitsch 1974), a domains-interaction approach (Hillson and Martin 1994), computer-drawn caricatures with various degrees of exaggeration (Rhodes, Brennan and Carey 1987), or the weight-judging paradigm (WJP; Deckers 1993; Ruch 2001; Ruch, Köhler, Beermann, and Deckers 2008). Such studies typically demonstrate the importance of an intermediate degree of incongruity.

So far little research was devoted to the *temporal* characteristics of the perception of humor. For example, wit is quick, in jokes there is still a sudden manifestation of the incongruous, while in humorous stories there might be a gradual realization of the incongruous. Thus, also the perception of funniness differs in intensity, duration and form over time. Finally, humor may involve different modes; for example, it can be verbal (e.g., jokes), graphical (cartoons, caricatures), acoustical (funny music), or behavioral (e.g., pantomime), again making matters very complex. So far, the scope of most theories is limited to the analysis of jokes and cartoons (but see Attardo 2001).

Motivational processes

One can argue that the cognitive-structural aspects in jokes are peripheral, as we might respond more to the connotative elements involved. For example, in the joke above some might experience a rapid succession of one's sympathy for a patient in pain and one's feelings towards adultery. Or, we just love the sexual element in there or are repulsed by it. Indeed, sexual themes apparently are one of the most prominent contents in humor (Grumet 1989). Also, other topics like scatological ones (bathroom humor), violence and aggression, sick, black, ethnic, blondes and Scots etc. come into mind when one does an intuitive classification and those are all content-related. Indeed, several theories tried to explain the favorite topics and targets.

Generally, two principal models can serve as a theoretical framework for deriving hypotheses for research on appreciation of tendentious content in

humor. According to Freud (1905), repressed impulses find relief in a disguised form in jokes as well as in dreams. The basic idea is that the Id is a pool for desires and drives. As society and parental influence (represented in the super ego) do not allow the direct expression of sexual and hostile impulses, gratification can only be achieved in an indirect way. Therefore, individuals repressing their sexuality or aggression should show a preference for sexual and aggressive jokes, respectively. Likewise, the actualization of sexual or aggressive drive (e.g., by presenting photos addressing the respective motive prior to presentation of humor) should increase funniness of jokes of the same content to follow. Further hypotheses deducible from Freudian theory are discussed by Kline (1977).

However, an alternative model was provided by the salience theory (Goldstein, Suls, and Anthony 1972). Their experiment showed that experimentally established salience of certain themes (in their case aggression, but also automobiles and music) leads to enhanced attention to these themes, to a better availability of the information necessary to understand the joke and finally to enhanced funniness of jokes with these themes. Salience theory was also extended to the study of individual differences in appreciation of sexual humor (Ruch and Hehl 1987, 1988). It was hypothesized that sexual topics are habitually more salient for individuals with positive attitudes towards sex, with more sexual experience and a higher degree of satisfaction, and therefore a positive correlation was expected between sexual experience and libido and appreciation of sexual humor on the other. Thus, in case of individual differences the salience theory and the Freudian theory predict opposite results. It was also argued to distinguish between positive and negative salience (Ruch and Hehl 1987). Results do favor a salience rather a Freudian interpretation (see section in this chapter), however, this can only be confirmed when the variance due to appreciation of the structure is controlled for.

Disparagement/superiority theory also does explain liking of aggressive content and preferred targets in humor (McGhee and Duffey 1983; Zillmann 1983). In short, according to the theory, funniness of a joke depends on the identification of the recipient with the person (or group) that is being disparaging and with the victim of the disparagement. The theory proposes that "... humor appreciation varies inversely with the favorableness of the disposition toward the agent or the entity being disparaged, and varies directly with the favorableness of the disposition toward the agent or the entity disparaging it". (Zillmann and Cantor 1976: 100–101).

This theory is in the tradition of a line of thinking that can be traced back to Plato and Aristotle. Aristotle reasoned that laughter arises in response to

weakness and ugliness. Thomas Hobbes (1651) stated that the passion of laughter is nothing else but some sudden glory arising from some sudden conception of some eminence in ourselves, by comparison with the infirmity of others, or with our own formerly. Laughter is thought to result from a sense of superiority derived from the disparagement of another person or of one's own past blunders or foolishness. Currently Gruner (1978) is one of the most outspoken champions of this approach as for him *ridicule* is the basic component of all humorous material, and if one wants to understand a piece of humorous material it is necessary only to find out who is ridiculed, how, and why. So for Gruner a combination of a loser, a victim of derision or ridicule, with suddenness of loss is necessary and sufficient to cause laughter.

Disparagement theory was most often tested with pre-existing groups, or in an individual differences approach, but there is also experimental support (Zillmann 1983). In an experiment half of the research participants were first negatively predisposed to a female experimenter (who behaved inappropriately to them). Then, in one experimental condition, a mishap occurred to the experimenter (she spilled a cup of tea on herself). Only this combination (angered subjects see experimenter spilling tea on herself) led to higher facial enjoyment. Spilling the tea alone did not do it when subjects were not negatively predisposed to experimenter or when the angered subjects saw her just spilling the tea (but not on her).

Research utilizing pre-existing groups (e.g., males vs. females, US-Americans vs. Canadians, professors vs. students, employers vs. employees) typically uses two sets of jokes or cartoons. One in which a member of the first group disparages a member of the other group, and another where the agent – victim – roles are reversed. Then the degree to which members of particular groups are amused by humor that disparages members of their own versus other groups is examined. For example, McGhee and Lloyd (1981) and McGhee and Duffey (1983) found that preschoolers found it funnier when an adult/parent is victimized in humor than when a child is victimized. Also, Zillmann and Cantor (1976) found evidence in support of this theory in a study in which a group of college students and a group of middle aged business and professional people were presented jokes involving people in superior–subordinate relationships (father–son, employer–employee, etc.). As predicted, students gave higher ratings of funniness to the jokes in which the subordinate disparaged his superior than to those in which the superior disparaged his subordinate, whereas the ratings of the professionals revealed the opposite relationship. These theories have been quite successful in predicting appreciation of racial, ethnic, political, and gender forms of

disparagement humor (see Zillmann 1983). However, it seems that the model works well in predicting the preferences of groups, which are traditionally superior (e.g. males appreciated jokes in which females were disparaged but showed less appreciation for jokes in which a female disparaged a male) but not of the inferior groups (females showed no preference for 'put down of male'-jokes). On the contrary, sometimes the inferior groups laughed more at jokes putting down a member of their own group.

Unfortunately studies of disparagement humor do not report the size of the intercorrelation among funniness scores of the humor categories (e.g., anti-male, anti-female humor) studied, nor do they report correlations with appreciation of non-disparagement humor. While the role of disparagement is supported by studies we do not know exactly *how much* of the variance in humor appreciation it actually accounts for. A simple but convincing demonstration of the relevance of disparagement in differential humor appreciation would be that, for example, there is a *negative* correlation between rated funniness of "American puts down Canadian" humor and funniness of "Canadian puts down American" when computed *across* a mixed sample of Canadians and Americans. Furthermore, even for the separate groups the correlations between parallel sets of disparagement humor (with the same target) should be much higher than their correlation with funniness of disparagement humor (with different targets) and even much higher with funniness of non-disparaging humor of the same (most likely the incongruity-resolution) structure. No such evidence yet exists.

In summary, the superiority/disparagement approach offers an explanation for how negative or hostile *attitudes* are expressed through humor. However, Suls (1977) has argued that the processing of disparagement jokes is the same as for all other humor (i.e., other incongruity-resolution jokes). There are the same two stages and the topic just affects how well the recipient masters those two. Suls suggested that disparagement humor typically involves an incongruity relating to some misfortune befalling a victim, and this incongruity can only be recognized or resolved (and therefore found funny) if one has a negative or unsympathetic attitude toward the victim.

Mood and other states

Humor may be facilitated or impaired by certain types of mood, frame of mind, and other states. In everyday language phrases like to be *in good humor*, *in the mood for laughing*, *out of humor*, *ill-humored*, *in a serious*

playful mood or frame of mind, etc. refer to such states of enhanced or lowered readiness to respond to humor or act humorously. We are all inclined to appreciate, initiate, or laugh at humor more at given times and less at others. Thus, we also need to consider and measure *actual* dispositions for humor; internal states and moods that vary over time. Like traits, those are internal dispositions. However, they are of a transient nature and may be affected by environmental and social factors. A *play signal* (McGhee 1979) may shift a serious frame of mind into a playful one, and alcohol might raise our level of cheerful mood; both, in turn, might facilitate responding more favorably to humor. A reciprocal relationship is likely too; laughing a lot will have an impact on mood level and frame of mind. Thus, there will be a feedback loop between actual states and moods and humor behavior.

For a more complete understanding of humor (and for successful experimenting) we do seem to have to distinguish among the components of trait, state/mood, and behavior/acts. *Traits* are relatively stable over time and consistent across situations. They may predict the emergence of humor-related mood and of humor behavior; e.g., individuals high in sense of humor may get into a cheerful mood more quickly when joining a merry group and they also might smile more often in response to attempts at jocularity. States are of shorter duration, fluctuate in intensity, and may vary in response to eliciting conditions. In cases of homologous states and traits, the trait may be seen as the average state; e.g., trait cheerfulness will correlate highly with measures of state cheerfulness aggregated across a longer time period. States may also be seen as dispositions for behavior. When we are in a silly mood we more readily engage in clowning behavior, and in an elated mood we will more likely laugh at a joke rather than merely smile.

Humor research has acknowledged the effects of mood/states on humor (see review by Deckers 2007). McGhee (1979) emphasized the importance of a playful (as opposed to serious) frame of mind for the successful processing of a humorous message. Apter and Smith (1977) distinguish between telic and para-telic states with the latter being conducive to humor. In their *reversal theory* (see Apter 1982) seriousness is one defining element in the *telic* or goal-oriented metamotivational state, while playfulness marks its obverse, the *paratelic* or non goal-oriented state. Svebak and Apter (1987) report that a funny videotape changed participants' state to paratelic. Relatedly, Raskin (1985) distinguishes between the *bona-fide* (serious, truth-committed) mode of communication and the *non-bona-fide* (humorous) mode of joke telling and argues that the non-humorous, serious person wants to function exclusively in the *bona fide* mode of communication. While no

explicit reference to frame of mind is made, one can see that this volitional aspect refers to a preferred state or frame of mind. Thus, whatever name they used, the theorists stated that the actual level of seriousness vs. playfulness is essential. Finally, several theoretical accounts of the humor process more or less indirectly refer to changing states of seriousness vs. playfulness. For example, Frijda (1986) considers laughter to be preceded by a sudden annulment of seriousness; for Sroufe and Waters (1976) and Wilson (1979) it follows the buildup of strain or tension and its abrupt relief, and Rothbart (1976) highlights the necessity that the setting in which the incongruity is processed is “safe” (i.e., non-dangerous, non-serious).

While theoretical accounts clearly suggest that humor research needs a concept of *state seriousness* (vs. playfulness or humorousness) to account for the fact that the individuals’ tendency, preparedness, and readiness to engage in humorous interactions differs over time, the empirical research conducted did not frequently involve this dimension of frame of mind (Deckers 2007). One reason might be that scales assessing current mood states do not include frame of mind but more affect-based mood states like *elation*, *sadness* or *excitement*. Thus, the few studies of mood and humor appreciation had to rely on whatever mood state was included in the multidimensional scale used. In such studies scales of *elation*, *vigor* and *surgency* did predict subsequent subjective and/or facial enjoyment of humor (Ruch 1990; Wicker, Thorelli, Barron, and Willis 1981). Those scales are not really tailored to the needs of humor research.

Analyses at the level of individual items showed that in two studies mood states relating to cheerfulness predicted facial enjoyment better than the global category of elation (Ruch 1990, 1995). This effect and the fact that negative mood states were not predictive of appreciation of humor anyway, gave rise to the idea to tailor the mood states more specifically to humor research and look for actual dispositions that might facilitate but also impair the induction of humor. Based on research of several sources (e.g., literature review, lexicon) a state-trait model of cheerfulness, seriousness, and bad mood was put forward, and scales for their assessment were created (Ruch, Köhler, and van Thriel 1996, 1997). The inspection of the factor loadings of the positive mood terms allowed distinguishing between the components of cheerful mood and hilarity (see Table 1). The former is more calm and composed and the latter is more aroused and contains the items relating to action tendencies (e.g., *I feel the urge to laugh*). State cheerfulness is expected to represent a state of heightened readiness to respond to a humor stimulus with enjoyment. It turned out that most interventions to increase appreciation of humor

Table 1. The definitional components of the state concepts

Facets of	Short description
<i>State cheerfulness</i>	
cheerful mood	Presence of a cheerful mood state (more tranquil, composed)
hilarity	Presence of a merry mood state (more shallow, outward)
<i>State seriousness</i>	
earnestness	Presence of an earnest mental attitude, task-oriented style
pensiveness	Presence of a pensive or thoughtful mood state
soberness	Presence of a sober or dispassionate frame of mind
<i>State bad mood</i>	
sadness/melancholy	Presence of a sad or melancholy mood state
ill-humor	Presence of an ill-humored (grumpy or grouchy) mood state

only worked for those being in a cheerful state (Ruch 1990, 1995, 1997; Ruch and Köhler 2007).

The model foresees two different states of humorlessness. While both serious individuals and those in a bad mood may be perceived as humorless, the reasons are different. In the latter case, the generation of positive affect is impaired by the presence of a predominant negative affective state; in the former, there is lowered interest in engaging in humorous interaction or in switching to a more playful frame of mind; i.e., a stronger aspect of volition is involved. There may be differences among bad mood facets as well. While an ill-humored person, like the serious one, may not *want* to be involved in humor, the person in a sad mood may not be *able* to do so even if he or she would like to. Also, while the sad person is not antagonistic to a cheerful group, the ill-humored one may be. Individuals high in trait bad mood might be predisposed to be “out of humor” easily; i.e. losing humor. Bad mood might also be a disposition facilitating certain forms of humor, such as mockery, irony, cynicism, and sarcasm (see Dworkin and Efran 1967; Ruch and Köhler 2007). The state part of the State-Trait Cheerfulness Inventory (STCI-S, Ruch et al. 1997) allows for scoring the seven facets as well as the three scales and thus the hypotheses relating to different states of humorlessness can be empirically examined.

Nevertheless, we need more research on the structure of mood states that have an impact on humor or are outcomes of humor. Furthermore, we need to investigate the dynamics of mood relating to humor. Deckers (2007) out-

lines the various effects linking humor and mood, such as mood and cognitive processing, mood regulation, effect of mood on activity preferences.

Personality

The trait approach to personality assumes that there are personality characteristics stable over time and consistent across situations. A trait or personality characteristic is a descriptive *hypothetical construct*, an invention, not an “existing” entity. It is a *disposition* for behavior, not the behavior itself. It cannot be observed directly but *inferred* via indicators, such as tests, questionnaires, behavior observation, etc. A certain conceptualization of sense of humor may be *useful* or *not useful*, but not *true* or *false*. Its usefulness has to be demonstrated empirically. There are different types of personality traits; at least we distinguish between ability (maximal performance) and style (typical behavior). However, the non-cognitive traits may be further divided into temperament, interests, attitudes, motivation, character strength, virtues, etc. Likewise, different forms of abilities may be distinguished, such as memory, convergent and divergent ability (or creativity). Those distinctions are not trivial, as they influence, for example, the type of questions to be asked, but also the type of measurement approach.

Everyday observation tells that there are enduring interindividual differences in humor behavior and experience. Some people tend *habitually* to appreciate, initiate, or laugh at humor more often, or more intensively, than others do. In everyday language this enduring disposition typically is ascribed to the possession of a “sense of humor.” Dictionaries typically contain various type nouns (e.g., *cynic*, *wit*, *wag*), trait-describing adjectives (e.g., *humorous*, *witty*, *cynical*), and verbs (to tease, to joke, to humor or wind up someone) that describe individuals characterized by one form of humor or the other. When members of a culture validly observe, distinguish and communicate among types of humorous and humorless people, when poets, play writers, and philosophers describe humorous characters, then there is plenty to base a psychological analysis on. Surprisingly, this has not been done to a great extent. Neither the pre-scientific accounts of the sense of humor have been modernized, nor is there a published attempt at systematizing the language of humor traits. Rather, psychologists worked on designing instruments, and some also worked on the concept. Craik and Ware (2007) is a good source for new directions in personality research on humor. A review of the historical and current accounts as well as a survey of instruments

can be found in a recent edited volume on the sense of humor (Ruch 2007a). Some representative approaches are discussed next. It should be mentioned beforehand that there is a variety of expressions in use often meaning the same thing (e.g., *sense of humor*, *styles of humor*, *humorous temperament*, *creation of humor*, *wit* etc.) and often the same expression is used for totally unrelated aspects of humor (Ruch 2007b).

Humor as a personality trait

McGhee (1999) presented a multi-faceted concept of the sense of humor. McGhee (1979) understands humor as a form of play – the play with ideas. Without a playful frame of mind, the same event is perceived as interesting, puzzling, annoying, frightening, etc., but not as funny. Therefore, playfulness and its counterpart, seriousness, were assigned core roles in McGhee's model of sense of humor (playfulness and seriousness are considered to be somehow antagonistic but form separate components of the model). While people might be very good at spotting the incongruities, absurdities, and ironies of life, only the mentally playful will find humor in them while those with a serious attitude or frame of mind will not treat them humorously. Therefore, playfulness is seen as the foundation or the motor of the sense of humor.

While playfulness forms the basis for the sense of humor, it is not a quality specific to humor. Six other facets represent more genuine humor skills and humor behavior and relate to individual differences in the fields of *enjoyment of humor*, *laughter*, *verbal humor*, *finding humor in everyday life*, *laughing at yourself*, and *humor under stress*. McGhee postulates that while children inherit playfulness, influences of socialization counteract it and may cause a shift into seriousness making individuals lose their ability to be playful. Again, the rediscovery of a playful attitude or outlook is a key element for change; its activation triggers the components specific to sense of humor.

There is empirical support for the structural part of this model. A study with the American and German versions of McGhee's sense of humor scale indeed confirmed that the six components (and only those) form a homogeneous factor that is separate from the good vs. bad mood and seriousness vs. playful factors (Ruch and Carrell 1998). However, the heterogeneity of the components "seriousness and negative mood" and "playfulness and positive mood" was apparent, and factor analysis of the items of the two scales clarified that it is better to reconceptualize them as "playfulness vs. seriousness" and "positive mood/optimism vs. negative mood/pessimism."

The dynamic part of the model is not yet substantiated. There is no empirical study yet aimed at examining whether a shift in seriousness vs. playfulness indeed enhances the sense of humor; i.e., that playfulness (and low seriousness) are “motors” for the other components of the sense of humor. While there is evidence that the training changes several components of the sense of humor (Sassenrath 2001), the intervention program that comes with the scale does involve a training of the skills measured by this scale. Therefore, strictly speaking, a positive evaluation of the effectiveness of the program cannot count as evidence. A convincing test of the hypothesis would involve a training of general playfulness (without any humor-related content) and yet the study provides evidence that the humor skills develop.

McGhee’s positive vs. negative mood (or good vs. bad humor) scale refers to a very old understanding of humor. After being a medical term (referring to the four basic body fluids blood, phlegm, black bile, and yellow bile associated with the so-called humor theory of temperament and humoral-pathology) since the ancient Greeks the term humor survived in anthropology. At that time one assumed that the predominance of humors or body fluids was responsible for labile behavior or mood in general. So in the middle of the 16th century *humour* referred to a more or less predominant mood quality, which could be either positive (*good humour*) or negative (*bad humour*). Good humoured and bad humoured eventually became dispositions. By the turn of the 16th century the dictionary definition of *good humour* was “the condition of being in a cheerful and amiable mood; also, the disposition or habit of amiable cheerfulness.” Such an affect-based state-trait approach to humor is the core of the next model.

Ruch and colleagues (Ruch and Köhler 1999, 2007; Ruch et al. 1996, 1997; Sommer and Ruch in press) start from an entirely different perspective than McGhee but yield a rather similar outcome. Their *temperament* approach to humor is based on the premise that the affective and mental foundations of humor are likely to be universal, even if the expression of humor may vary across cultures and time. Therefore they bypass the concept of “sense of humor” and also specific humor behaviors that may be culture specific but focus on the “underlying” temperamental factors. Considering that humor is not unidimensional, not unipolar and covers both affective and cognitive factors they postulate that cheerfulness, seriousness, and bad mood are the traits forming the *temperamental basis* of humor.

Based on the study of several sources for each trait a facet model consisting of five to six facets was generated and tested in several (German, American, English) samples. For example, trait cheerfulness (i.e., the disposition

for being in good humor) was considered to be composed of a prevalence of cheerful mood, a low threshold for smiling and laughter, a composed view of adverse life circumstances, a responsiveness to a broad range of elicitors of amusement and smiling/laughter, and a generally cheerful and humorous interaction style. Factor analyses as well as a facet-sorting task confirmed that those components indeed go together and form a broad factor of *trait cheerfulness* (i.e., the disposition for "being in good humor"). Trait cheerfulness and the sense of humor according to McGhee correlate to the extent of .85; i.e., they are practically interchangeable (Ruch and Carrell 1998).

Similarly, the postulated facet models for trait seriousness (a quality of the frame of mind relating to humorlessness) and bad mood (i.e., the disposition for "being in bad humor" composed primarily of melancholy and grumpiness) found empirical confirmation. The relationships between the three concepts were outlined and tested and it was found that cheerfulness is negatively correlated with both seriousness and bad mood (with the coefficients being smaller for the former and higher for the latter). Seriousness and bad mood are slightly positively correlated. The same pattern of relationship also emerged for the three concepts as states. Furthermore, the testing of the structural assumptions also involved as joint factor analysis of state and trait items that confirmed that while homologous states and traits form distinguishable factors they are positively intercorrelated (Ruch et al. 1997). Several studies show that these three components of the humorous temperament can predict a variety of humor behaviors (see Ruch and Köhler 2007). Pilot studies investigating the neural bases of trait cheerfulness are underway (Rapp, Erb, Rodden, Ruch, Grodd, and Wild 2008).

Martin, Puhlik-Doris, Larsen, Gray, and Weir (2003) adopted a combined rational and empirical approach in their search for potentially adaptive and maladaptive styles of humor. They started by examining the past theoretical literature for forms, uses, or styles of humor that have been described as adaptive and beneficial versus maladaptive and malignant (e.g., Allport 1961; Freud 1928). Based on this review, they concluded that adaptive and maladaptive humor should each be further divided into two separate components, one involving humor that is interpersonal (i.e., directed towards others), and the other being intrapersonal (i.e., focused more on the self). This led them to hypothesize four distinct dimensions of humor, namely affiliative, self-enhancing, aggressive, and self-defeating humor, each postulated to be composed of a set of definitional components.

Affiliative humor involves the tendency to say funny things, to tell jokes, and to engage in spontaneous witty banter to amuse others, to put others at

ease, to facilitate relationships, and to reduce interpersonal tensions. According to the authors this adaptive interpersonal humor style may also include self-deprecating humor (i.e., the tendency to say funny things about oneself, while maintaining a sense of self-acceptance) and is a non-hostile, tolerant sort of humor that is affirming of self and others. *Self-enhancing* humor involves a generally humorous outlook on life, a tendency to be frequently amused by the incongruities of life, and to maintain a humorous perspective even in the face of stress or adversity. The authors hypothesize that self-enhancing humor relates to perspective-taking humor, the use of humor as an emotion regulation or coping mechanism, and that this adaptive intrapsychic humor style is consistent with the Freudian definition of humor.

Aggressive humor involves sarcasm, teasing, ridicule, derision, “put-down,” or disparagement humor (as referred to by the “superiority” theories of humor). Furthermore, this maladaptive interpersonal styles also was thought to involve humor that is used to manipulate others by means of an implied threat of ridicule, the tendency to express humor without regard for its potential impact on others (e.g., sexist or racist humor), and compulsive expressions of humor in which one finds it difficult to resist the impulse to say funny things that are likely to hurt or alienate others. Finally, *self-defeating* humor involves excessively self-disparaging humor, attempts to amuse others by doing or saying funny things at one’s own expense as a means of ingratiating oneself or gaining approval, allowing oneself to be the “butt” of others’ humor, and laughing along with others when being ridiculed or disparaged. This maladaptive self-directed humor dimension is also hypothesized to involve the use of humor as a form of defensive denial, or the tendency to engage in humorous behavior as a means of hiding one’s underlying negative feelings, or avoiding dealing constructively with problems. Individuals who are high on this humor dimension may be seen as quite witty or amusing (e.g., “class clowns”), but there may also be an element of emotional neediness, avoidance, and low self-esteem underlying their use of humor. Martin et al. (2003) used several samples to carefully examine what the best set of items is to represent those concepts in the final version of the *Humor Styles Questionnaire* (HSQ). Also they tried to keep the intercorrelations among the scales low. In order to achieve this some components that correlate on two or more scales needed to be dropped.

Martin et al. (2003) used peer-evaluation on a single representative item to provide initial evidence for convergent and discriminant validity (Campbell and Fiske 1959) of the four concepts. The validity is also supported by the fact that there are plausible correlations with other humor scales. For

example, the *self-enhancing* humor scale correlates highly with the *Coping Humor Scale* (CHS); the author's (Martin and Lefcourt 1983) prior measure of the degree to which subjects report to use humor in coping with stress. The HSQ also aims to replace the *Situational Humor Response Questionnaire* (SHRQ; Martin and Lefcourt 1984). This instrument defines the sense of humor as the "frequency with which a person smiles, laughs, and otherwise displays mirth in a variety of life situations", and was used rather successfully in research on stress and coping (see review by Martin 1996: 253–254). While the self-enhancing and affiliative humor scales correlate significantly and fairly strongly with the SHRQ and CHS, the aggressive and self-defeating scales seem to assess dimensions that are not tapped by these measures. Adaptation of the concept underlying the HSQ to other cultures yielded that the four dimensions by and large can be recovered from the translated items (Chen and Martin 2007; Kazarian and Martin 2006; Saroglou and Scariot 2002; Tümkaya 2007).

Martin and colleagues used a top-down approach. They grouped theories and derived representative statements for them. These were then empirically purified with the aim to derive homogeneous scales. A contrary approach would be to disregard homogeneity but underscore the representativeness and exhaustiveness of the humor behaviors, attitudes, feelings, habits or whatever is being sampled. Indeed, research shows that the list of humor-related acts is not endless. For a comprehensive approach to humor one could collect statements that can be made to describe individuals' everyday humor behavior. Furthermore, it is difficult to justify that some behaviors are more important or central than others, as it is implicitly done when scales are built around a cluster of items (perhaps at the expense of items that are less redundant).

The approach by Craik and collaborators (Craik, Lampert, and Nelson 1993, 1996; Craik and Ware 2007) bears in mind such considerations. They also pursue a theory-guided approach to humor and highlight the importance of a community-oriented analysis of personality and humor. During their lives people obtain a reputation in the social network they live in and other members of the community can provide a comprehensive portrait of the target person's style of humor when aided by an appropriate assessment tool, such as the *Humorous Behavior Q-sort Deck* (HBQD; Craik et al. 1996). Three features characterize the measurement approach underlying the HBQD, namely the attempt to cover the whole behavioral domain of everyday humorous conduct as comprehensively as possible (rather than formulating partly redundant items for the assessment of a few selected traits or components of humor), the focus on humor-related *behaviors* or behavior tendencies and,

when aggregated, styles of humorous conduct, and the application of the Q-sort technique to the assessment of humor rather than using conventional questionnaires.

Craik et al. (1996) generated the set of 100 non-redundant statements from a survey of the theoretical and empirical psychological research literature on humor and from observations of everyday social life. For each of

Table 2. The 10 styles of humorous conduct *sensu* Craik et al. (1996)

I+. Socially warm humorous style Maintains group morale through humor. Has a good sense of humor. Uses good-natured jests to put others at ease. Relative to other traits, displays a noteworthy sense of humor.	I-. Socially cold humorous style Smiles grudgingly. Responds with a quick, but short-lived smile. Is a ready audience but infrequent contributor of humorous anecdotes. Has a bland, deadpan sense of humor.
II+. Reflective humorous style Is more responsive to spontaneous humor than to jokes. Uses humor to express the contradictory aspects of everyday events. Takes pleasure in bemused reflections on self and others. Appreciates the humorous potential of persons and situations.	II-. Boorish humorous style Imitates the humorous style of professional comedians. Recounts familiar, stale jokes. Tells funny stories to impress people. Is competitively humorous, attempts to top others.
III+. Competent humorous style Displays a quick wit and ready repartee. Manifests humor in the form of clever retorts to others' remarks. Enhances humorous impact with a deft sense of timing. Has the ability to tell long, complex anecdotes successfully.	III-. Inept humorous style Reacts in an exaggerated way to mildly humorous comments. Laughs at the slightest provocation. Spoils jokes by laughing before finishing them. Laughs without discriminating between more and less clever remarks.
IV+. Earthy humorous style Has a reputation for indulging in coarse or vulgar humor. Delights in parodies which others might find blasphemous or obscene.	IV-. Repressed humorous style Does not respond to a range of humor due to moralistic constraints. Is squeamish about "sick jokes."

Table 2. (cont.)

IV+. Earthy humorous style Relishes scatological anecdotes (bathroom humor).	IV-. Repressed humorous style Enjoys hearing jokes but rarely remembers them.
V+. Benign humorous style Finds intellectual word play enjoyable. Enjoys witticisms which are intellectually challenging. Enjoys limericks and nonsense rhymes. Enjoys exchanging topical jokes and keeps up to date on them.	V-. Mean-spirited humorous style Occasionally makes humorous remarks betraying a streak of cruelty. Needles others, intending it to be just kidding. Is scornful; laughs “at” others, rather than “with” them. Jokes about others’ imperfections.

Note: Table adapted from Craik and Ware (2007)

the statements they determined the degree of social desirability. Based on a principal components analysis of self-descriptive HBQD portraits by 456 university students they arrived at a tentative, and as yet not replicated, set of 10 humor styles that are grouped along five bipolar factors. Table 2 presents illustrative statements characterizing each of these 10 styles.

What is the nature of those styles? The *Socially Warm versus Cold Humorous Style*, at its positive pole, reflects a tendency to use humor to promote good will and social interaction, and, at its negative pole, an avoidance or aloofness regarding mirthful behavior. The *Reflective versus Boorish Humorous Style* describes a knack for discerning the spontaneous humor found in the doings of oneself and other persons and in everyday occurrences, at the positive pole, and an unsightful, insensitive and competitive use of humor, at the negative pole. The *Competent versus Inept Humorous Style* suggests an active wit and capacity to convey humorous anecdotes effectively, at its positive pole, and a lack of skill and confidence in dealing with humor, at the negative pole. The *Earthy versus Repressed Humorous Style* captures a raucous delight in joking about taboo topics, at the positive pole, and an inhibition regarding macabre, sexual, and scatological modes of humor, at the negative pole. Finally, the *Benign versus Mean-spirited Humorous Style*, at its positive pole, points to pleasure in humor-related activities that are mentally stimulating and innocuous and, at its negative pole, focuses on the dark side of humor, in its use to attack and belittle others.

Craik et al. (1996) show that the “sense of humor” primarily covers two styles, the socially warm and the competent humorous styles. However, the

study is based on the quotidian term (i.e., the current understanding of sense of humor by laypeople), not the concept stemming from a theory, or the philosophical literature. Craik and Ware (2007) demonstrate the usefulness of the tool for the analysis of the humor style of comedians, such as Woody Allen, Whoopi Goldberg, and Lucille Ball.

This approach did yield the most differentiated structural model so far. Also, it seems to be most comprehensive in terms of the behavioral indicators. Several studies made use of this approach (e.g., Kirsh and Kuiper 2003; Saroglou 2004). Unfortunately, most studies only apply the scale, or variants of it, but the pool of statements was rarely used to investigate the model or to develop it further (Esser 2001). The model also seems ideally suited to test method variance in humor assessment as some of its dimensions can be assessed by different measurements approaches as well. For example, earthy humor could be compared with the typical joke test of funniness of sick, sexual or bathroom humor, and competent humor might be related to performance tests of being witty.

Humor as an ability

The etymology of the term *wit* involves knowledge, mind and reasoning capacity and even today the term wit (like *esprit*) is the humor term showing the strongest semantic link to superior intelligence (Schmidt-Hidding 1963). In the past humor and wit sometimes meant the same thing, but often they were seen as opposed to each other. As Schmidt-Hidding (1963) pointed out, the term wit, like humor, did not enter the field of the comic before the late 16th century. At this time a *humour* meant an odd, uncommon, and eccentric character whose peculiarities emerged from an imbalance of body fluids and who therefore was laughed at. This involuntary funny, odd and quaint object of laughter later became known as the *humourist*, and the *man of humour* took pleasure in exposing and imitating the peculiarities of the humourist. During this period humor and wit became seen as *talents* relating to the ability to make others laugh. Before that humor was merely understood as a predominant mood. The idea that humor involves a component of ability prevails until today, although this concept is less well understood and a variety of names (e.g., wit, humor creation, humor production) are being used.

Today, wit may be defined as the ability to make clever remarks in an amusing way. It is a talent referring to using unexpected associations between contrasting or disparate words or ideas to create a clever humorous

effect. Thus, it is appropriate to conceptualize this aspect of humor as ability, rather than style. The instructions would ask the test taker to deliver his or her *maximal* behavior – to do the best. The outcome can be judged for its quality (i.e., degree of funniness or originality), suggesting we are talking about divergent intelligence (not convergent, as in the case of right or wrong answers), or creativity. The crucial point here is though that the person is *creating* a humorous effect (not retelling or performing something created by someone else); i.e., is confronted with something not inherently funny but manages to bring it into a funny context.

In contrast to this performance or ability approach to humor production, some psychologists also pursued a temperament or competence approach. Here we are not so much interested in the ability to actually create humor, but in the stylistic aspects (e.g., skills, motivation) of delivery. We all know people who love to entertain others using prefabricated material (stories, jokes) who can't come up with any funny line themselves. Also, those who love to entertain others differ in how well they actually are performing. Babad (1974) distinguished between humor *production* and *reproduction*, and showed that the two are uncorrelated in individuals. So there are additional factors involved beyond the ability to create humor, and for a fuller description and prediction of humor performance behavior there is indeed room for other, non-cognitive, concepts.

It should be noted that in a similar manner appreciation of humor might involve ability too. Jokes differ in complexity and some are "hard to get". This has been discussed especially in the developmental psychology literature where an optimal fit between the child's cognitive ability and the difficulty level of jokes was expected to result in maximal funniness (McGhee 1974; Zigler et al. 1966). However, as mentioned above, Derks et al. (2007; see also Cunningham and Derks 2005) argued that appreciation of humor should be discussed in terms of expertise rather than intelligence.

Initial studies of wit tried to separate humor creation from humor appreciation (and they indeed turn out to be largely independent), and intended to show its strong relationship to creativity and a weaker one to intelligence (Babad 1974; Brodzinsky and Rubien 1976; Fabrizi and Pollio 1987; Koppel and Sechrest 1970; Köhler and Ruch 1996). Wit typically was assessed by presenting a set of cartoons with captions removed, and testees were instructed to make up humorous captions, which were subsequently rated for funniness by trained judges. In other studies they were asked to comment on films in a funny way or to write a funny presidential campaign slogan. Unfortunately, we don't have studies using several such tests at once (of dif-

ferent types, e.g., repartee, humorous fiction, cartoons etc.) to see how their convergent validity and dimensionality is.

Components have been separated at a rational basis. Feingold and Mazella (1991, 1993) developed a multidimensional model of “wittiness.” They defined wittiness as the ability to perceive in an ingeniously humorous manner the relationship between seemingly incongruous things. According to them wittiness is composed of the three dimensions of humor motivation, humor cognition, and humor communication. This model of wittiness is not a pure ability model as it covers not only the person’s ability to create humor, but also the degree to which the person is motivated to be funny and is able to communicate the humor effectively. Humor cognition is an intellectual variable related to intelligence and creativity, whereas motivation and communication humor are related to social and temperamental variables. The authors developed measures of each facet of the model, which were generally found to correlate with each other. Feingold and Mazella (1991) distinguished between two types of “verbal humor ability”, namely memory for humor (akin to Cattell’s crystallized intelligence) and humor cognition (comparable to fluid intelligence). The former is measured by tests of humor information and joke knowledge, and the latter measured with tests of humor reasoning and joke comprehension. Research with those measures revealed significant correlations between traditional measures of verbal intelligence and the tests of humor cognition, whereas memory for humor was not strongly related to intelligence. Humor reasoning was also correlated with creative thinking.

Finally, some multidimensional models of humor do contain elements that seem to refer to ability in general, and humor creation ability in specific (e.g., Craik and Ware 2007; Svebak 1974; Ziv 1984), although they rely on questionnaire approach. Svebak (1974) suggested that individual differences in sense of humor involve variations in the three dimensions of meta-message sensitivity, personal liking of the humorous role; and emotional permissiveness. The first of these dimensions involves a cognitive ability (i.e., the ability to take an irrational, mirthful perspective on situations, seeing the social world as it might be rather than as it is) related to intelligence or creativity, the second has to do with attitudes and defensiveness, and the third involves emotional temperament. Similarly, Ziv (1979) distinguishes between humor creation and humor appreciation, and in the model by Craik et al. (1996) one of the five factors relates to a *Competent Humorous Style* suggests an active wit and capacity to convey humorous anecdotes effectively (compared to the *Inept Humorous Style*, referring to a lack of skill

and confidence in dealing with humor at the negative pole). Those scales have been shown to have low correlations with ability measures of humor creativity (e.g., Köhler and Ruch 1996).

Humor as a virtue/character strength

Wit as an ability to produce a comic effect may be used to hurt or to cheer someone up who is low; i.e., it can be benevolent or malevolent. If someone does a mistake, one may poke fun at the weaknesses of this person or one may portray human weaknesses in general in a benevolent way, so that no-one is excluded and the person who was befallen by a mishap share the amusement. By the end of the 17th century the influence of humanism brought about a gradual shift in dispositions from humor as a sheer *ability* (a talent of ridicule, wit, or humor) to make others laugh to a *virtue* of sense of humor. People had become weary of “put-down” witticisms and it was argued that people should not be laughed at because of peculiarities of temperament, since they were not responsible for them. Rather one should smile kindly at an imperfect world and human nature. Moralists tried to distinguish between “true” and “false” wit, as they did between “good” and “bad” humor. The term “humor” acquired its positive, versus formerly neutral, meaning. At this time virtuous use of humor was started and elements like being able to laugh at one’s misfortunes or liking to laugh at one’s own expense were valued. According to Schmidt-Hidding (1963) in the 19th century *humor* became a specific English cardinal virtue, joining others such as *common sense*, *tolerance*, and *compromise*.

The idea of humor as a virtue still prevails in our thinking about humor as we do tend to associate humor with positive phenomena only. Also questionnaires of sense of humor are typically blind to the dark side of humor. Nevertheless, the idea of humor as a virtue was never explicitly transformed into a modern personality concept and there is no instrument specifically measuring virtuous humor behavior. In this sense, humor as virtuous behavior still needs to be rediscovered.

However, recently, the positive psychology movement rediscovered the potential of humor as a contributor to the good life. Peterson and Seligman (2004) see humor as part of the “good character.” Their model of character distinguishes between virtues, character strength and situational themes. Six core virtues that are considered to be universal: wisdom, courage, humanity, justice, temperance, and transcendence. Humor is located at the level

of character strength, i.e., the psychological mechanisms and processes that define the virtues. There are 24 such strengths and humor is seen to define the virtue of transcendence. Other strengths in that cluster are *appreciation of beauty and excellence* (i.e., noticing and appreciating beauty, excellence, and/or skilled performance in all domains of life), *gratitude* (i.e., being aware of and thankful for the good things that happen), *hope* (i.e., expecting the best and working to achieve it) and *spirituality* (i.e., having coherent beliefs about the higher purpose and meaning of life). Those components of transcendence are seen as strengths that forge connections to the larger universe and provide meaning. However, empirically this cluster proved not to be very homogenous.

The inventory of strengths based on that classification (i.e., the VIA-IS) is a 240 items self-report questionnaire measuring the 24 strengths with 10 items each. Indeed, studies in Austria, Germany, Japan, the USA, and Switzerland confirm that the VIA-IS humor scale is a good predictor of satisfaction with life (Peterson, Ruch, Beermann, Park, and Seligman 2007; Ruch, Huber, Beermann, and Proyer 2007), as measured by the SWLS (Diener, Emmons, Larsen, and Griffin 1985). Thus, humor is one component enabling the good life. An analysis of the items of the VIA-IS together with 11 other humor scales shows that all six virtues were present in the item contents (Beermann and Ruch 2008). While overall the items primarily reflected the virtues of humanity and wisdom, the VIA-IS items were assigned to the virtues of humanity and transcendence.

Humor as an aesthetic perception

From the beginning of testing of sense of humor psychologists were interested in the individual's "taste" in humor (for a review of scales see Ruch 2007b). What sort of humor does the person find hilarious and which ones are considered to be dull? Does this preference tell something about his or her personality (that conventional personality questionnaires can't reveal)? Such tests typically consist of a set of jokes, cartoons and/or limericks that are to be rated for degree of funniness. Some tests yield only one total score, but others are multidimensional and represent a classification of humor, that was derived either intuitively, theoretically, or empirically.

The *Antioch Sense of Humor Test* (Mindess, Miller, Turek, Bender, and Corbin 1985) may be regarded as an example for an intuitive classification. It allows to assess a variety of humor categories, such as nonsense, philosoph-

ical, sexual, scatological, social satire, hostile, demeaning to men, demeaning to women, ethnic, and sick humor. While intuitive and theory based classifications provide plausible categories, they may have difficulties to empirically demonstrate that the scales are indeed homogenous and distinguishable from each other.

Factor analysis was used to empirically explore the stimulus and response dimensions. There is some agreement across studies; for example sexual humor always emerges as one separate factor, but jokes pre-classified as “aggressive” rarely end up in the same factor. Also, beginning with the first factorial study by Eysenck (1942), structural factors, like complexity/simplicity showed to be of importance. However, unlike in general research on personality, humor studies do not use each other’s items (i.e., the best markers of factors) and hence comparability of findings is often limited. Also, there have been few systematic attempts at building taxonomy and many “one shot”-studies. Also, different research strategies may account for discrepant outcomes. For example, Catelli and coworkers advised participants to keep the number of *funny* and *dull* jokes about equal (thereby keeping their average level of humor appreciation equal). This probably eliminated the major factors and so he extracted 12 presumably minor ones that are difficult to replicate (for reviews of all approaches, see Martin 2007b; Ruch 1992).

What aspects are then reflected in individual differences in the perception of humor? Humor theorists have long acknowledged that, in humor, content and structure (or: joke work vs. tendency (Freud 1905); thematic vs. schematic (Sears 1934); cognitive vs. arctic factors (Eysenck 1942)) have to be distinguished as two different sources of pleasure, and factor analytic studies confirm that both are potent variance-producing factors. While intuitive and rational taxonomies typically distinguish only between content classes, factor analytic studies show that structural properties of jokes and cartoons are at least as important as their content, with two factors consistently appearing: namely, incongruity-resolution (INC-RES) humor and nonsense (NON) humor. Jokes and cartoons of these factors have different contents (e.g., themes, targets) but are similar with respect to structural properties and the way they are processed.

In short, jokes and cartoons of the INC-RES humor category are characterized by punch lines in which the surprising incongruity can be completely resolved. The common element in this type of humor is that the recipient first discovers an incongruity which is then fully resolvable upon consideration of information available elsewhere in the joke or cartoon. There is a certain projective element in these jokes as essential things are not spelled out and have

to be supplemented by the recipient; often resolving the incongruity requires attributing motives and traits (e.g., stingy, mean, stupid, absent-minded) to the characters depicted in the jokes. Although individuals might differ with respect to how they perceive and/or resolve the incongruity, they have the sense of having “gotten the point” or understood the joke once resolution information has been identified. At the time this factor was first extracted, it seemed that the two-stage structure in the process of perceiving and understanding humor described by Suls (1972) is a model that fits well to these jokes and cartoons, and hence incongruity-resolution humor was considered to be an appropriate label for that factor.

Nonsense humor also has a surprising or incongruous punch line, however, “... the punch line may (1) provide no resolution at all, (2) provide a partial resolution (leaving an essential part of the incongruity unresolved), or (3) actually create new absurdities or incongruities” (McGhee, Ruch, and Hehl 1990: 124). In nonsense humor the resolution information gives the appearance of making sense out of incongruities without actually doing so. The recipient’s ability to make sense or to solve problems is exploited; after detecting the incongruity he is misled to resolve it, only to later discover that what made sense for a moment is not really making sense. Rothbart and Pien’s (1977) impossible incongruities that allow only for partial resolutions are characteristic of the nonsense factor, while their possible incongruities allowing for complete resolutions are more prevalent in INC-RES humor.

There is evidence for different neural bases of INC-RES and NON humor. Samson, Hempelmann, Zysset, and Huber (in press) presented 30 cartoons of each humor type to 17 subjects and found that in the superior frontal gyrus bilaterally, right medial frontal gyrus and the temporo-parietal junction bilaterally there is more activity for incongruity-resolution humor in contrast to nonsense humor.

The third factor, sexual (SEX) humor, may have either structure, but is homogeneous with respect to sexual content. All jokes and cartoons with a sexual theme (and exclusively those) load on this factor. While the sexual humor category was initially the easiest to identify, it had to be considered that sex jokes and cartoons typically have two loadings: one on the sexual humor factor and a second on one of the two structure factors. The size of this second loading seems to depend on the degree of the theme’s salience. Thus, one has to distinguish between a factor of sexual humor, which is composed of the content variance of the sexual jokes and cartoons only (bereft of the structure variance), and the sexual humor category (as used in humor tests), in which both content and structure are involved. Whereas a sexual humor

Table 3. The 3 WD categories distinguished by (original and derived) GTVH-parameters

GTVH-parameters	INC-RES	NON	SEX
Degree of incongruity	medium	high	medium (high for NON SEX)
Degree of residual incongruity	medium	high	low (high for NON SEX)
Degree of resolution	very simple to complex	very simple to very complex	–
Script opposition	diverse	actual/not actual less often; possible/ impossible more often	diverse
SO antonymy	diverse	diverse	sex/non sex prevails
Logical mechanism	diverse	diverse	False analogies (especially in INC-RES and PURE)
Narrative Strategy	Text, cartoons with 1 panel	Cartoons with a higher number of panels	Text, cartoons with 1 panel (NON SEX with more panels)
Pornotopia	does not apply	does not apply	prevails in PURE SEX
Target	involves targets frequently	involves targets rarely	involves targets frequently (NON SEX rarely a target)

Note: Adapted from Hempelmann and Ruch (2005)

factor usually is orthogonal to the two structure factors, the sexual humor category correlates with nonsense and incongruity-resolution humor due to the structure overlap. Hempelmann and Ruch (2005) undertook a GTVH-analysis of the 60 jokes and cartoons of the 3 WD. The distinguishing features are listed in Table 3.

Table 3 shows that the *General Theory of Verbal Humor* (GTVH; Attardo and Raskin 1991) can contribute to the analysis of the 3 WD. However, it is more the parameters derived from the GTVH that seem to distinguish among the humor types rather than the original parameters (e.g., script opposition, logical mechanism, narrative strategy, target).

These three humor factors consistently explain approximately 40% of the total variance. They are considered to provide an exhaustive taxonomy of jokes and cartoons at a very *general* level. Even when the recipients typ-

ically are asked how funny they find the joke *at the moment* and not in general, the response is quite trait-like. Factor analytic studies show that there is only about 5% state variance in the funniness scores. Also, manipulation of internal state or external conditions (Derks et al. 2007) does not yield strong effects and retest correlations are sufficiently high (Ruch 1992). These factors were first extracted in studies of Austrian samples and later replicated in Western countries like Belgium, England, France, Germany, Israel, Italy, and Turkey (Ruch and Hehl 2007). While most of these studies were in collaboration with researchers from the respective countries, they cannot be regarded as independent replications of the factor structure. Such studies would perhaps use markers of the factors but else use representative samples of humor from the respective country. Carretero-Dios, Perez, and Buela-Casal (in press) were able to separate factors of incongruity-resolution and nonsense in Spain; however, they did not use the 3 WD to confirm the convergent validity. Recently, Ruch and Hehl (2007) argued that other structural models need to be tested that might be more appropriate and maybe would allow for the identification of further, perhaps more specific content categories. More studies need to be done on substantiating the interpretation of the factors.

Factor analysis was also used to uncover the dimensions of appreciation. Results show that the response mode in humor appreciation is defined by two nearly orthogonal components of positive and negative responses best represented by ratings of *funniness* and *aversiveness* (Ruch 1992). Maximal appreciation of jokes and cartoons consists of high funniness and low aversiveness; while minimal appreciation occurs if the joke is not considered funny but is found aversive. However, a joke can also be considered not funny but be far from being aversive; or it can make one laugh although there are certain annoying aspects (e.g., one can consider the punch line original or clever but dislike the content of the joke).

Subsequent work, however, suggested that the component of positive responses might actually be a broad dimension transcending by far what has been called the “humor response” (i.e., the perception that a stimulus is funny). Factor analytic studies (Ruch and Rath 1993) of responses to humor yielded a strong factor of positive evaluation fusing the perception of the stimulus properties (e.g., funny, witty, original) and the induced feeling state (being amused, hilarity). Furthermore, studies of facial responses (e.g., Ruch 1995) show that rated funniness or experienced amusement correlates very highly with smiling and laughter. It has therefore been suggested that the responses to humor are explicitly conceptualized as an emotion covering

the experiential level, behavior, and physiology (Ruch 1993). Factor analysis also suggested that negative ratings might be further split into two separate but correlated clusters, representing milder, and more cognitive (e.g., plain, feel bored) and stronger affective (e.g., tasteless, feel angered) forms of aversive reactions (Ruch and Rath 1993).

Joke and cartoon based tests of humor appreciation were the dominant approach to the measurement of the sense of humor. When Lefcourt and Martin (1986) started their stress-moderation studies they did not find such tests useful for their purposes. While their judgment was probably right, they were misinterpreted often as if they had said that tests of humor appreciation were not of use at all, and subsequently the interest in such tests declined for a while. Questionnaire measures became more fashionable and showed their utility. However, humor questionnaires don't predict actual creation of humor and appreciation of jokes and cartoons well. Meanwhile the interest in humor appreciation measures got stronger again (e.g., Carretero-Dios, Perez, and Buela-Casal in press).

Humorlessness and “pathologies” of humor and laughter

The different approaches discussed above can be scrutinized how they treat “absence of humor” and whether or not they see forms of humor as disrespected or even pathological. Being in a “paratelic state” or serious frame of mind will prevent individuals engaging in humorous interactions or non bona fide mode of communication.

In terms of appreciation of jokes and cartoons, being prone to respond with negative affect (i.e., find humor easily aversive) might count as humorless, but it might also show a superior moral attitude. Furthermore, some would probably suggest that joking about certain topics is “bad taste,” “sick,” and showing a bad vicious character (Kuipers 2006). Again, this might be the blind spot of the recipient of humor rather than telling something about the person acting.

Humor as a strength clearly involves a unipolar dimension running from low to high humor, assuming that humor has no clear “opposite.” The term “humorless” is indicating the lack of humor, not an opposite trait. The question is what is below this zero point? When we look for antonyms, dictionaries point to serious-mindedness. Indeed, serious-mindedness is seen as a crucial factor in several temperamental models (McGhee 1996; Raskin 2007; Ruch and Köhler 2007). So is bad (or negative) mood; a trait needed to predict how

easily people are “out of humor” (McGhee 1996; Ruch and Köhler 2007). The aggressive and self-defeating humor styles might represent bad taste or unhealthy forms of humor but they do not explicitly represent humorlessness. The other style approach to humor (Craik et al. (2007) involves styles that tap into the region below zero and might be seen as humorless (e.g., inept, socially cold), and earthy might be seen to represent bad taste.

The ability approaches to humor contribute to humor impairment in a variety of ways. One can see the habitual inability to get a joke as a form of lacking humor. Likewise, people might have low skills in performing humorously and not be able to make up funny things on the spot. These might probably best be described as phenomena located at the lower end of an else unipolar scale.

The question arises whether there are more severe “pathologies.” Clearly, there are pathologies of laughter, such as laughter as part of an epileptic fit, as an effect of poisoning, or unmotivated laughs due to pseudobulbar palsy (Wild, Rodden, Grodd, and Ruch 2003). Furthermore, various brain damages go along with impairments either to detect incongruity (or “surprise”) or resolve it (or “coherence”) (Bihrlé, Brownell, Powelson, and Gardner 1986; Forabosco 2007). In the clinical field, Salameh (2006) described “humorphobia” and “sado-maso” humor, and Titze (1996) postulated the existence of a pathological fear of being laughed at: Gelotophobia.

Derived from *Gelos*, the Greek word for laughter, and phobia, meaning fear, drawing from both literature and clinical observations, Titze (1996, in press) applied a phenomenon called the Pinocchio Complex (wooden physical appearance in psychosomatic patients) to gelotophobes – those with a fear of being laughed at. Gelotophobes have the distinct conviction that there is something wrong with them and that they are ridiculous to others, who enjoy laughing at them. Ruch and Titze (1998) designed a pilot instrument for the assessment of Gelotophobia, the *Geloph <46>*, from descriptions given by clinical Gelotophobic patients. Ruch and Proyer (2008a) studied these items in healthy adults and various clinical groups (non shame-based neurotics, shame-based neurotics, gelotophobes) and found that this list of statements describing the experiential world of gelotophobes was basically unidimensional. Most importantly, the group of gelotophobes (identified via a clinical interview) scored highest on this dimension. Ruch and Proyer (2008b) proposed a scoring key for a final scale containing 15 items, which should enable more in-depth explorations of the concept of the fear of being laughed at.

Based on the insights from the clinical case studies provided by Titze (1996) a model of the putative causes and consequences of Gelotophobia was

produced (Ruch 2004), which guided the empirical studies of the concept. It should be noted that while Titze sees Gelotophobia as a clinical category, Ruch and Proyer (2008b) outlined and studied the fear of being laughed at as a non-pathological dimension, to be studied among healthy adults. Nevertheless, cut-off points for diagnosing slight, marked and extreme manifestation of the fear of being laughed at were developed.

The concept was originally developed in Germany. Hence a cross-cultural study (Proyer, Birden, Platt, Altfreder, Glauser, and Ruch 2005) was started to verify that Gelotophobia does exist in other countries as well. Indeed, the 14 countries (with altogether 3526 participants) studied yielded a noticeable number of gelotophobes. Later this study was expanded to include more than 70 nations. Furthermore, the fear of being laughed at was studied in answers given to ambiguous social situations; i.e., in a semi-projective test (Altfreder 2000). Studies showed that gelotophobes misperceive auditorily presented laughter of a positive quality, and consider it to be negatively motivated. Likewise, Platt (2008) illustrated that gelotophobes have difficulty in discriminating good-natured teasing from ridicule. Individuals with pronounced Gelotophobia respond to prototypical ridicule scenarios with shame and fear; but they also report experiencing these emotions in response to good-natured teasing as well. Ruch, Beermann, and Proyer (in press) show that gelotophobes score lower in most components of humor, but not generally so. While gelotophobes consider their humor abilities to be inept, this cannot be verified by a performance test of wit. Other studies show that gelotophobes indeed have experienced shame in a higher intensity than others and happiness in a lower intensity. Furthermore, their personality may be described by neurotic introversion with a tendency towards psychoticism (Ruch 2004). Other studies investigated the prevalence of the fear of being laughed at among psychiatric groups, the actual frequency of being laughed at for a variety of reasons, the body image, and the satisfaction with life (see the special issue by Ruch in press). In sum, one can state that gelotophobia represents one form of humor pathology.

Factor analytic studies of humor tests

The above-mentioned approaches coexist and might be useful or different for different purposes. There is no single model that claims to cover all aspects of humor. Some are intentionally narrow and focus on one or a few aspects. Others are quite comprehensive. Nevertheless, it is unlikely that they make

all others redundant. In the domain of self-reports, the model underlying the HBQD is the most complex one as it involves five bipolar dimensions with 10 styles. So it might be the best candidate for a single all encompassing measure. However, as discussed above, it is not clear whether it predicts appreciation of jokes and cartoons, and it does not predict humor creation *behavior* well. So right now, there is no universal measure for all aspects of humor. It is also questionable whether we should aim at such a measure. Nevertheless, it is very important to see how these measures overlap and how many dimensions we need to distinguish to describe a person's sense of humor.

This leads to questions like where do the current approaches overlap? How much redundancy is there? Do we arrive at a better or more comprehensive model when we jointly look at all conceptual approaches simultaneously? One could apply the most widely used scales to the same sample and then perform factor analysis at the level of individual items or at the scale level. Exactly this has been done in a few studies (Köhler and Ruch 1996; Korotkov and Hannah 1994; Ruch 1994; Ruch and Carrell 1998).

The two studies with the highest number of scales used (Köhler and Ruch 1996; Ruch and Carrell 1998) involved 24 subscales of humor inventories. Joint factor analyses confirmed that all sense of humor scales available at that time and all facets of cheerfulness always merged in a potent first factor. In study one this comprised elements such as *a prevalent cheerful mood*, the tendency to *smile or laugh and to be merry*, *coping humor and cheerful composedness*, *initiating humor/liking to entertaining others*, *liking of humor stimuli*, and a positive attitude about *things being related to cheerfulness and playfulness*. In the second study McGhee's (1999) sense of humor components (i.e., *enjoyment of humor*, *laughter*, *verbal humor*, *finding humor in everyday life*, *laughing at yourself*, and *humor under stress*) marked this factor equally well as the facets of cheerfulness did. Thus, the affect-based temperament and the major factor underlying the sense of humor instruments used seem to be indistinguishable. Of the inventories published meanwhile most likely the *affiliative* and *self-enhancing* humor style of the HSQ (Martin et al. 2003) and the *socially warm vs. socially cold humorous* style (of the HBQD) would load on this factor too.

While the sense of humor scales in the first study all shared a common loading on the cheerfulness (or affect-based sense of humor components) factor, they differed with respect to whether they were also loaded negatively by seriousness, the second factor, and how marked this loading was. While the more affect-related humor scales were close to the axis, the sense of humor

scales involving mentality or attitudes were additionally loaded negatively by seriousness and thus located in the cheerfulness/low seriousness quadrant. In the second study the seriousness factor was bipolar due to the use of McGhee's component of playfulness. Thus, a variety of humor concepts can be represented on these two dimensions of cheerfulness and seriousness/playfulness. The third factor in study two was mainly composed of the bad mood facets and the negative mood scale of the McGhee scale. Obviously, the relevance of trait seriousness and bad mood for the sense of humor can only be demonstrated if the inventories sampled also cover humorlessness.

Thus, traditional humor scales seem primarily to tap into a two-dimensional system of affect (good vs. bad humor) and mentality (serious vs. playful frame of mind). Taking into account that the HBQD humor measures five styles of humorous conduct one can assume that at least three dimensions are unaccounted for by the traditional sense of humor scales. Thus, future research will need to study whether those additional factors are replicable and what their nature is. Also, the aggressive and self-defeating constructs of the HSQ (Martin et al. 2003) go well beyond the scope of the conventional sense of humor scales.

Replication of the factors in the domain of self-report is not the only criterion. A confirmation in other domains such as peer-reports, behavior observation, or performance tests should be required. For example, aggressive, earthy, or mean-spirited humor may be reflected also in ratings of best friends or in the liking of humorous material of such content. Likewise, self-reports of being witty or competent in humor would gain in validity if they correlate to a reasonable extent with behavioral tests of wittiness, or humor creation. A pilot study of self-report and performance measures of appreciation and creation of humor, however, did not yield high correlations across assessment approaches suggesting the presence of method variance and low convergent validity for the measures (Köhler and Ruch 1996).

Such studies might look like statistical exercises to some. Nevertheless, they are essential if humor research wants to make a significant step forward. In order to be able to accumulate research findings we need to have a common taxonomy or classification of humor traits and states. How else can we compare findings from different laboratories all over the world? This problem is not unique to humor. Also in other disciplines progress was mainly made once a common frame of references was established (e.g., the periodic system in chemistry; diagnostic manuals in psychiatry). Serious humor researchers should primarily work on establishing such a framework. While we had an enhanced activity to construct humor scales during the last 25 years, too little

effort was spent on comparing the approaches and working on a more general model transcending the different domains.

Humor instruments

Within psychology the branch of psychometrics was developed which provides knowledge about how to construct tests and evaluate their quality (Kline 2000). There are several ways to construct a scale, several test theories to choose from, recommendations on how to write items etc. In psychological assessment different measures for both, personality and mental abilities are available. In both cases a broad variety of strategies exists. For example, in personality assessment most commonly *questionnaires* (self-reports) are used. However, (semi-) *projective* tests, (structured) *interviews*, or (structured) *behavior observations* (*ratings of behavior*) are available as well.

A psychological test should fulfill several criteria that show its usefulness. *Objectivity*, *reliability*, and *validity* are the most important ones. A test that fulfills the *objectivity*-condition is a test for which everyone who scores the test follows the same scoring rules and gets the same report from the scoring procedure. Thus, it is aimed at diminishing the influence of subjective evaluations of a test score. The *reliability* of a test is a criterion that defines the degree to which the score of a test is not biased by a random measurement error (i.e. a not expected influence on the score). A high reliability of a test ensures that the results are reproducible and stable over time. It is possible to compute the so-called “standard error of measurement” which allows an estimation of a persons’ true score in the test (the true score is not biased by measurement errors). For each test a reliability coefficient ranging from 0 (lowest) to 1 (highest; i.e., no measurement error) can be computed. The coefficient may mainly be interpreted in terms of *alternate-forms reliability* (correlation of two test forms), *parallel-forms reliability* (correlation of two parallel forms of a test), *split-half reliability* (the test is split into two halves – e.g., by taking the even and odd-numbered items – and the correlation between the two halves is computed), *test-retest reliability* (“temporal stability”, administering a test at two independent occasions and computing the correlation between the two scores), and in terms of *internal consistency* (“coefficient alpha”, “Cronbach’s alpha”). The latter provides information on the consistency of a person’s scores in the test and is one of the most commonly used statistic for showing the reliability of a test. A commonly used rule of thumb is that a test should not be used (at least for important

decisions) if the alpha-coefficient is below .70 and that it should be above .90 for decision about an individual. Reliability is a precondition for the validity of a test.

The *validity* describes in how far a test measures what it is intended to measure. There are different forms of validity. For example, *face validity* (the assumption that the items from a test “look good”, i.e. seem to measure what is intended), *content validity* (the items of a test are representative for a special domain) or *predictive validity* (the degree to which a test predicts a specific criterion; e.g., behavior). Additionally, the *construct validity* is of special interest. It is aimed at showing the relation between the test score and the psychological construct it is intended to measure. Usually this is shown by its *convergent* (correlation to a well-established test for the same construct; same trait) and *divergent validity* (correlation to measures of unrelated constructs; different trait).

Campbell and Fiske (1959) suggested that convergent and divergent validity are best tested in a so-called multitrait-multimethod matrix (MTMM). Their approach of testing the validity of a test includes tests of the same and different traits and additionally, they demand that the relations should even be stable if the methods used for the data collection are different. While objectivity, reliability, and validity are the most important quality criteria of psychological tests there are many other criteria to be considered as well. For example, the *fairness* of a measure (i.e. equal opportunities for members of different groups that take the test) or the use of appropriate norm values for the respective research questions. Further information can be retrieved from Cronbach (1984) or Cooper (2002).

Measuring humor has sometimes been considered to be an impossible task due to the elusive nature of the concept. Nevertheless, throughout the 20th century there were numerous attempts to develop measures of the sense of humor and related states and traits. Ruch (2007b) surveyed the existing humor measurement tools and found more than 60 instruments. Mostly those were self-report questionnaires or joke/cartoon tests, but occasionally also methods, like humor diaries, informant questionnaires/peer-reports, behavioral observations, experimental tasks or interviews and informal surveys were used.

In self-report trait measures of humor the testee reacts to statements or answers to questions how he or she typically behaves. The testees either indicate how strongly they endorse a statement or disagree with it, or give the quantity/frequency of a certain behavior. As humor is a desirable trait a few individuals might overestimate their humor. Using a Q-sort technique, in which

the frequency for each step of the answer scale is set, may prevent such tendencies. A peer-report version of a trait measure of humor typically uses the identical questions. Then two or three good acquaintances of the target person fill in the questionnaire (questions are reformulated in a “he/she”-format) and inform how the target person typically behaves, thinks, or acts. The use of friends, spouse, siblings, parents or colleagues at work typically adds complementary non-redundant information about the humor of the target person, as the target and acquaintances do have access to different information. Typically, the aggregate of two peer-ratings personality traits and the self-report yields coefficients of .40. This is also a coefficient that should be expected for humor instruments. Such questionnaires may be unidimensional (e.g., the Situational Humor Response Questionnaire-SHRQ; Martin and Lefcourt 1984) or multidimensional; i.e., measuring several dimensions (e.g., Multidimensional Sense of Humor Scale-MSHS; Thorson and Powell 1993).

In state measures of humor the testee indicates how he or she feels or is mentally set in the moment, the last hour, or the last day or week. Obviously, state measures should be as homogenous as trait measures, but the temporal stability cannot be expected to be high, but in a .20–.40 range. In performance (joke/cartoons) tests of humor the individual does not reflect on how he or she typically behaves in daily life but this behavior is elicited and recorded under controlled conditions. More precisely, in humor appreciation tests the individual is confronted with a test booklet containing the set of humorous stimuli and an answer sheet with rating scales where the testee records his or her subjective experience (e.g., the IPAT humor test of personality by Cattell and Tollefson 1966; the Antioch sense of humor test by Mindess, Turek, Bender, and Corbin 1985; EUHA by Carretero-Dios, Perez, and Buéla-Casal in press). Sometimes the material is grouped into piles (“like,” “dislike” or “indifference”), or nonverbal indicators of enjoyment are recorded (e.g., the Mirth Response Test by Redlich, Levine, and Sohler 1951). Performance tests of wit or humor creation can be quite diverse, but most often the individual is confronted with an incomplete joke or cartoon, and is asked to write as many funny captions as possible. Or they are asked to comment something in a funny way etc (Lefcourt and Martin 1986). The frequency and quality of the captions, also contents may be later evaluated. For example, e.g., 5 to 10 raters judge the degree of funniness of the material produced or the persons humor creation ability and wit (Köhler and Ruch 1996). Once a great range of answers is assembled and evaluated for funniness (e.g., 6–10 raters), anchors for different quality might be derived and used as an aid for scoring individual answers by a fewer numbers of people doing the coding.

Is humor research equipped with appropriate measuring instruments? While probably more than 70 humor measurement tools may have been constructed meanwhile, the state of the art is not really satisfactory. Many of the methods were *ad hoc* measures constructed and used in only one single study. The construction did not always use the state of the art methodology. Also, they were not very explicit about the concept that was being measured. While most often these scales were simply labeled "sense of humor" tests, the contents were quite diverse (suggesting a lack of convergent validity), and none of those scales measured actually the sense of humor as described in the classic literature (e.g., as a world view). Also, often there was not much empirical work done on the meaning of the concept prior to the construction of the own questionnaire. Therefore most instruments are not representing any existing theory or offering a new model.

A special issue on the measurement of the sense of humor (Ruch 1996) documented the progress that has been made in the 90-ies of the last century, and some new instruments were constructed. In the following a few prototypical current instruments are described (see Ruch 2007b for a comprehensive list of tools, and Martin 2003 and Peterson and Seligman 2004 for reviews of humor instruments).

The *Coping Humor Scale* (CHS; Martin and Lefcourt 1983) is a seven items self-report questionnaire reflecting the degree to which individuals report using humor to cope with stress which respondents rate in terms of endorsement on a four-point scale. The internal reliability (alpha coefficient) of the CHS ranges from .60 to .70, and the test-retest reliability (12-week period) is .80. There is considerable construct validity support for the CHS (summarized in Lefcourt and Martin 1986; Martin 1996, 2007). For example, high scores in the CHS were correlated with peer ratings of individuals' tendency to use humor to cope with stress ($r = .50$) and to not take themselves too seriously (r 's = .58 to .78). Also, the CHS was significantly correlated with the rated funniness of participants' humorous monologues created while watching a stressful film ($r = .50$). Finally, the CHS scale moderates the effects of life stress on mood disturbance (Martin 1996). The CHS probably does not measure what Freud (1928) understood by humor as a mature defense mechanism. Führ (2002) developed a coping humor scale for use with children.

The *Situational Humor Response Questionnaire* (SHRQ; Martin and Lefcourt 1984) is a self-report questionnaire of sense of humor composed of 21 items measuring the frequency with which a person smiles and laughs in a wide variety of life situations. These situations may be aversive but also pleasant. The testee rates the items in terms of intensity of response on

a 1–5 scale. The internal reliability of the SHRQ ranges from .70 to .85 and the test-retest reliability is .70. Martin (1996) gives a review of validity studies of the SHRQ. For example, the SHRQ correlates with the frequency and duration of spontaneous laughter during unstructured interviews and with peer ratings of participants' frequency of laughter and tendency to use humor in coping with stress (r 's ranging from .30 to .50). Furthermore, scores correlated with rated funniness of monologues created by participants in the laboratory. Finally, the SHRQ has been shown to moderate the effects of life stress on mood disturbance (for reviews see Martin 1996, 2007).

The *Humor Styles Questionnaire* (HSQ; Martin et al. 2003) is a self-report questionnaire composed of 32 items in a seven point-answer format measuring four styles of humor, namely self-enhancing, aggressive, affiliative, and self-defeating humor. Internal reliability (alpha coefficients) ranges from .77 to .81, and the (one week) test-retest reliability from .80 to .85. Initial evidence for construct validity is provided in terms of multiple correlations with other humor scales (they range from .47 to .75) and correlations between questionnaire and one peer report (one item per scale; coefficients range from .22 to .33). Evidence for criterion validity is provided by correlating the HSQ with a variety of indicators of psychological health, well-being, mood, and personality. The scales of social and self-enhancing humor correlate moderately positively with self-esteem, well-being, and social intimacy, and negatively with depression and anxiety. The aggressive and self-defeating humor scale correlates positively with aggression and hostility, and self-defeating relates negatively with depression, anxiety, well-being, self-esteem, and social support. The scale has been used to study regional differences in the USA (Romero, Alsua, Hinrichs, and Pearson 2007). Furthermore, international versions are available for use with participants from countries such as, China, Belgium, Germany, Lebanon and Turkey (Chen and Martin 2007; Kazarian and Martin 2006; Saroglou and Scariot 2002; Tümkaya 2007).

The *Humorous Behavior Q-sort Deck* (Craik et al. 1996) is a Q-sort technique consisting of one hundred descriptive statements describing specific forms of everyday humorous conduct. The respondent (or an observer) sorts those statements into piles from one to nine, with one being the least, five being neutral, and nine being most characteristic of the person being assessed with the following specified distribution: 5, 8, 12, 16, 18, 16, 12, 8, 5. Craik and Ware (2007) recommend the HBQD for studying the everyday humorous conduct of persons in three levels: (1) at the individual level of descriptive statements, by analyzing its 100 items separately; (2) at the overall pattern level, by incorrelating individual or composited HBQD descriptions; and

(3) at the stylistic level, by calculating factor scores for individual HBQD descriptions. The latter level allows to interpret the five style of humor found by (Craik et al. 1996), namely the *socially warm* versus *cold*, *reflective* versus *boorish*, *competent* versus *inept*, *earthy* versus *repressed*, and *benign* versus *mean-spirited* humorous styles.

The internal reliability (alpha coefficients) ranges from .61 to .71, except for style 2 (which is .43). Information regarding construct validity is provided by several studies (Craik et al. 1996; Craik and Ware 2007). The HBQD discriminates among comedians in a plausible way, and there are correlations with a sense of humor index. In a sample of 60 Irish students the correspondence between self and peer report was very high for socially warm (.52), earthy (.63), benign (.55) and competent (.37) humor styles and low for the reflective (.17) humor style. A study with 91 German adults yielded high coefficients for the earthy (.56), competent (.44) socially warm (.32), and benign (.23) humor styles, and again a low and not significant one for the reflective (.16) humor style (Esser 2001). This suggests that, rater and rated person disagree primarily on one of the styles. Clearly, they have different access to the information necessary for that judgment. Furthermore, the correlations with several personality scales were studied, among them the California Psychological Inventory (CPI), Myers-Briggs Type Indicator (MBTI), and the Big Five Inventory (BFI) (Craik et al. 1993, Esser 2001). The scale, or variants of it were used in several studies (e.g., Kirsh and Kuiper 2003; Kuiper, Grimshaw, Leite, and Kirsh 2004; Priest and Thein 2003; Ruch, Beermann, and Proyer in press; Saroglou 2004).

The *State-Trait Cheerfulness Inventory* (STCI; Ruch et al. 1996, 1997) is a self-report questionnaire for the assessment of *cheerfulness*, *seriousness*, and *bad mood* both as *states* (STCI-S) and *traits* (STCI-T). There are 20 and 10 items per scale for the trait and state versions, respectively, which respondents rate in terms of endorsement on 1–4 point scales (strongly disagree to strongly agree). The internal reliability (alpha coefficients) of the trait scale for adults ranges from .88 to .94, and the test-retest reliability from .77 to .86 (4 weeks). The state part has high internal consistency too (.85 to .93), and the stability over a month is low (.33 to .36), as expected. The self-reports of the traits correlate .53 to .66 with peer reports (average of three good friends). The self-reports of the traits correlate with the homologous states, with the size of correlations higher for the aggregated states and the longer lasting states than for a single measurement of one state. Recently, Sommer and Hösli (2006) introduced a version for use with children and youth. There are self- and peer-rating forms for both the child and adult versions.

State and trait cheerfulness predicts amount of laughter in a variety of experimental settings, and predicts ease of induction of cheerful mood and robustness of mood when facing adversity. The STCI-T cheerfulness scale correlates about .57 with the SHRQ and CHS, and .30 to .74 with various other humor scales (e.g., Köhler and Ruch 1996; Martin et al. 2003). The STCI has been validated in a variety of settings, including the study of the humor of teachers (Rissland 2002), the study of humorous interactions among pupils (Bönsch-Kauke 2003), as well as its relation to personality (Ruch and Köhler 2007; Wrench and McCroskey 2001), emotional intelligence (Yip and Martin 2006), and well-being (Maas 2003). The state part with special instruction was used to evaluate the effects in humor intervention studies in samples of healthy adults (Sassenrath 2001), depressed elderly (Krantzhoff and Hirsch 2001; Hirsch and Krantzhoff 2004), COPD patients (Brutsche et al. 2008), and schizophrenic patients (Falkenberg, Klügel, Bartels, and Wild 2007), but also to examine the effects of experimental interventions (Ruch and Stevens 1995; Thompson, Ruch, and Hasenoeherl 2004). (For more information on the construct validity see Hilscher 2005; Köhler and Ruch 1996; Ruch 1997; Ruch and Carrell 1998; Ruch and Köhler 1999, 2007).

Finally, a scale should be mentioned that was not designed for use in research but as a source of personal feedback for individuals` participating in a program for the improvement of the sense of humor. As the effectiveness of this program (McGhee 1996) is best tested when this scale is included as well, one needs to know more about its psychometric properties and hence it needs discussion. The sense of humor scale (SHS; McGhee 1996) is a rationally developed scale utilizing 40 items in a four-point answer format (1 = strongly disagree; 4 = strongly agree) and is aimed at measuring the sense of humor and its eight components, namely enjoyment of humor (SHS-1), seriousness and negative mood (SHS-2), playfulness and positive mood (SHS-3), laughter (SHS-4), verbal humor (SHS-5), finding humor in everyday life (SHS-6), laughing at yourself (SHS-7), and humor under stress (SHS-8). The SHS can be scored for the eight subscales by adding the five items per subscale. Furthermore, a "humor quotient" can be derived by adding the eight subscales giving *laughing at yourself* and *humor under stress* higher weights (1.5 and 2, respectively). This was based on the untested assumption that the latter two skills are more difficult to develop than the others.

A first psychometric analysis with American and German participants (Ruch and Carrell 1998) yielded reliability coefficients of .92 and .90 for the total scores in the US and German sample, respectively. The reliabilities of the subscales (with 5 items each) yielded coefficients between .56 and .78 with

a median of .71. As .60 is typically seen as the lower bound of acceptable reliability for research purposes, the subscale “laughter” could not be recommended for use. Furthermore, it seemed that the SHS scales are best seen as representing three different factors. The new version of the SHS is a 40 item-instrument in a 7 point-format (1 = strongly disagree, 7 = strongly agree) measuring the three domains of *playful vs. serious attitude* (8 items), *positive vs. negative mood* (8 items), and *sense of humor* (24 items). While there are only four items per scale the answer format increased to seven points. There are no psychometric data available for this scale yet.

Beermann, Gander, Hildebrand, Wyss, and Ruch (in press) provide preliminary evidence that the “laughing at yourself”-subscale of the first version of the SHS is indeed predictive of the homologous behavior in an experimental setting. Also, for the total score there is a satisfactory self-peer correlation ($r = .44$). The coefficients for the individual scales ranged from .21 (humor under stress) to .57 (Playfulness and Positive Mood) with a median of .35. The SHS scales showed a high convergent validity with the STCI scales (Ruch and Carrell 1998). The fact that the training of the sense of humor (containing elements that cover the contents of the scale) yielded an increase in the SHS scales supports its validity (Sassenrath 2001).

The 3 WD (3 Witz-Dimensionen) test of humor appreciation (Ruch 1992) is a performance test measuring funniness and aversiveness of incongruity-resolution humor, nonsense humor and sexual humor in which 35 jokes and cartoons are rated on two seven-point scales (e.g., 0 = not at all funny; 6 = very funny). The first five items are used for “warming up” and are not scored. The jokes and cartoons are presented in a test booklet with two or three items on a page. The instructions are typed on the separate answer sheet, which also contains the two sets of rating scales. Usually, six scores may be derived, three for funniness and three for aversiveness of incongruity-resolution (INC-RES), nonsense (NON), and sexual (SEX) humor. Furthermore, several indices have been derived and validated (Ruch 1992, Ruch and Hehl 1988; Ruch et al. 1990). Scores of total funniness and total aversiveness (computed by adding the ratings of the three categories) served as indicators of the subject’s overall positive and negative responses to humor, respectively. A *structure preference index* (SPI; obtained by subtracting INC-RES from NON) allows assessing the relative preference for resolution in humor over unresolvable or residual incongruities and *vice versa*. Likewise, when hypotheses relate to the *content* of sexual humor, indices of appreciation of sexual content (see Forabosco and Ruch 1994) are used to increase the power of the test.

Internal reliability (alpha coefficients) of the six regular scales range from .81 to .91, and the retest reliability (4 weeks) ranges from .60 to .74. The construction of parallel versions allowed the estimation of the reliability based on equivalence of tests, which yielded high coefficients too (.82 to .93). Construct validity was assessed by correlations with other humor instruments. The 3 WD scales are uncorrelated from affect-based sense of humor measures, but correlate with humor performance measures, (low) seriousness, and type nouns related to humor and humorlessness. They correlate with various measures of preference for different types of art (especially with the simplicity-complexity dimension) underscoring the similarity between appreciation of humor and of aesthetics. Finally, a myriad of studies examined correlations with various dimensions of personality, attitudes and values, and so on (see reviews in Ruch 1992, 2002; Ruch and Hehl 2007).

Development of humor over life span

The development of humor appreciation during childhood received much attention in the 1970s and 1980s of the last century (see Bariaud 1983; Bergen 2007; McGhee 1979, 1983; McGhee and Chapman 1980 and McGhee, Ruch, and Hehl 1990; for reviews). Later, attention was drawn on development during the entire life span (Nahemov, McCluskey-Fawcett, and McGhee 1986) but comparatively few studies followed. The results often stem from applying tests of sense of humor to samples of a broader age range. More recent studies of children's humor expand the scope of components studied to humor in real life interactions (Bönsch-Kauke 2003) and the use of humor as a coping device (Führ 2002).

While philosophers and psychologists have advanced numerous theories of humor, theoretical models of humor development have been rare. Primary attention has been given in these models to the development of incongruity-based humor and to the role of cognitive development in determining general developmental changes. McGhee (1979) reviews the existing theories of humor development and puts forward a four stage-model of humor development during childhood. McGhee viewed humor as a form of intellectual play and argued that the level of humor a child is capable of understanding and producing at any given point in development depends primarily on the level of cognitive functioning achieved. Drawing primarily from a Piagetian theoretical framework, this cognitive-stage theory suggests that each new major cognitive acquisition leads to the appearance of a qualitatively different form

of humor. McGhee et al. (1990) advance a personality-based model of humor development extending from late adolescence until about age 60 which is subsequently tested (Ruch et al. 1990). This model builds upon the earlier taxonomic studies of humor appreciation which document the importance of two principal humor-appreciation factors (nonsense and incongruity plus resolution), and from a broad range of data demonstrating age-related changes in personality measures closely associated with these two factors (Ruch 1992).

Methodologically we do need to separate different questions. There might be differences between generations or cohorts; i.e., today's 20 year olds might find one type of humor funnier than the 20 year-old-ones 50 years ago. Those changes in humor appreciation might be predictable by social and societal changes (e.g., the changing role of men and women and the appreciation of gender stereotypes; or the role of media transporting different forms of humor) or by the sheer fact that some joke contents are topical and do not mean much to people 50 years later. There also might be genuine developmental changes; i.e., humor is different for the same people at different stages in their life. For example, one might expect that the use of philosophical humor increases with age. This requires longitudinal studies where the same individuals are tested repeatedly (i.e., two or more times) years apart. At best with parallel tests that don't get outdated. So far humor research can only draw on results from cross-sectional studies. Most often these data come from studies where sense of humor instruments are applied to a sample with a wider age range.

One such cross-sectional study investigates the age differences in traits considered to be the temperamental basis of humor. In a study of six age groups from late adolescence to people older than 60 years there were no major trends in trait cheerfulness across age (Ruch et al. 1996; Ruch and Zweyer 2001). A later analysis with approximately 2000 individuals confirmed this result, however, there was a peculiar drop of trait cheerfulness for the age group between 30 and 40 years. This drop is similar to the ones found for satisfaction with life (Myers and Diener 1993). For trait seriousness, there was no difference among the groups below the age of 40. However, from thereon it significantly increased among all adjacent age groups. A similar increase was observed for cheerful composure, a measure akin to humor in the traditional sense (Ruch et al. 1996).

More is known about humor appreciation. McGhee (1979) discusses the results for early development in humor appreciation. Ruch, McGhee and Hehl (1990) tested their model of the development of incongruity-resolution and nonsense humor during adulthood in a sample of 4,292 14- to 66-year-

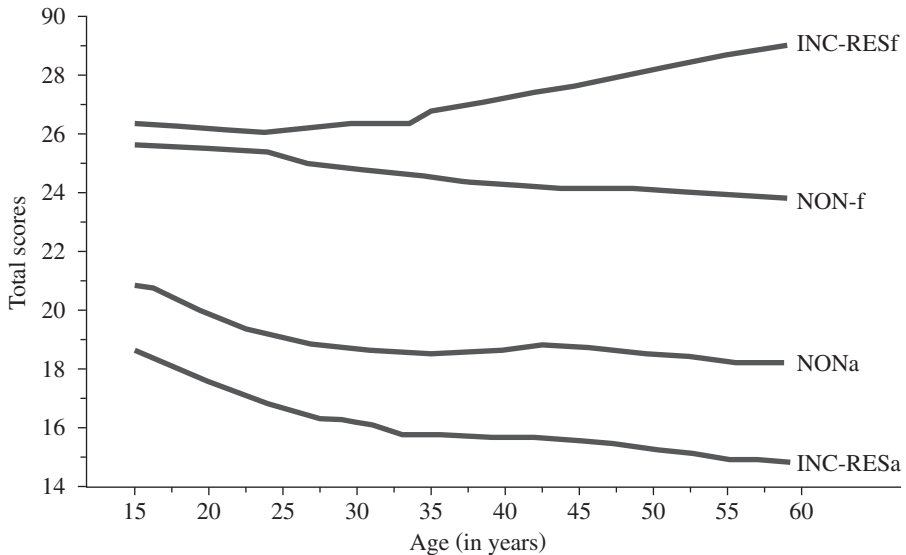


Figure 1. Development of humor appreciation across the life span (INC-RESf = funniness of incongruity-resolution humor, NONf= funniness of nonsense humor; NONa = aversiveness of nonsense humor; INC-RESa = aversiveness of incongruity-resolution humor) (Drawn from data presented in Ruch et al. 1990).

old Germans. Twenty jokes and cartoons representing structure-based humor categories of incongruity-resolution and nonsense were rated for funniness and aversiveness. The results generally confirmed the hypotheses. Incongruity-resolution humor increased in funniness and nonsense humor decreased in funniness among progressively older subjects after the late teens. Aversiveness of both forms of humor generally decreased over the ages sampled (see Figure 1).

Age differences in humor appreciation were strongly correlated with age differences in conservatism. An especially strong parallel was found between age differences in funniness of incongruity-resolution humor and age differences in conservatism, the major predictor of appreciation of incongruity-resolution humor. In other words, appreciation of resolvable types of humor changes when degree of conservatism (i.e., the need for closure and stability) changes with age too.

Nothing much is known about changes past the age of 60 years. Also we do not know whether those changes depicted above are mere cross-sectional differences or genuine developments. There might be a generation gap in

humor too. Therefore, we do need longitudinal studies albeit short time ones with different age cohorts.

We also lack in developmental studies of other forms of humor. Test constructors typically give information about the correlation of the new humor scale with age (e.g., Martin et al. 2003). However, correlations do only indicate the linear trend in age related differences. The samples typically are too small to give a more fine-grained analysis of means for different age groups. Once larger samples are accumulated, reviews of the validity of the scale should involve the study of age differences. This will give a first hint of what differences might be expected in subsequent short-term longitudinal studies.

Factors that support or impede humor

Speakers of most languages know expressions referring to somebody losing or cultivating his/her sense of humor. However, most research regarding environmental influences on humor has looked at the effects of current physical and social factors on current perceived funniness of, or amount of laughter to humor (e.g., Chapman 1983) and only rarely have examined the longer lasting effects on humor as an individual differences variable. Nevertheless, some research exists regarding the proximal and distal antecedents of humor. Basically, these factors either posit that humor is a natural extension of one's emotionality or playfulness, or developed as a means of coping with life's less pleasant circumstances. Given the current lack of knowledge on the importance of nature and nurture in humor one can only speculate about the relative importance of those factors.

As regards facilitating factors, the existence and cultivation of "joking relationships" could be crucial. That is, peers that encourage unrestricted indulgence in all forms of humor, where funny ideas can be exchanged and humor skills developed; where people can freely "regress" and even be silly and childish. If humor is modeled, then besides parents, teachers and peers also the media will have to be considered. Nowadays humor is offered in abundance in form of books, funnies in newspapers, films, TV, on stage, etc. so that there are plenty of occasions to learn how to be funny, either by sheer reproduction or by learning the rules and generating ones own humor on the spot. Obviously, with all those factors a bidirectional relationship can be assumed (e.g., humorous people might be more likely to engage in joking relationships, and engaging in joking relationships might increase one's humor) and hence a design allowing for a causal analysis is necessary.

Intervention programs

As mentioned in the beginning, psychology is not only interested in describing, explaining and predicting behavior, but also in controlling it. Being able to change behavior is a proof for controlling it. So can we change humor? Does it make sense to try so? So far behavioral genetic studies show only a medium size contribution of genetic factors to individual differences in sense of humor and most studies show no genetic contribution to appreciation of cartoon humor. Thus, there is plenty of room for environmental factors and for learning in the etiology of humor. Therefore knowledge of the factors that bring about humor might be used to deliberately change people's sense of humor – if they wish. As humor is a highly regarded personal resource many might be interested in raising their humor skills. Likewise, some forms of humor are not considered to be socially appropriate, and thus there might be the need for a retraining of humor as well. Psychologists have a longstanding interest in developing and evaluating intervention programs aimed in fostering desirable and reducing undesirable behavior.

How can such changes be brought about? According to Nevo, Aharonson and Klingman (2007) theoretically two opposing approaches to improving humor can be distinguished. Adopting a psychoanalytic perspective one can predict that improvements in sense of humor will emerge indirectly as a result of therapy or maturation. A general inner change into a more healthy direction will bring about improvements in humor. An application of techniques directed at the humor itself is not needed; nor will they be of any effect. Alternatively, one can adopt a cognitive behavioral approach and predict that the direct learning of deficient behaviors, reinforcement, and cognitive restructuring will activate and improve humor. Before such a program can be recommended and routinely applied it needs to be evaluated empirically. This requires instruments that are sensitive to change (for pre-post comparisons) and the utilization of groups getting the humor training (at best over many weeks) but also control groups that merely meet as often (but do not get a humor training) or just fill in the scales in same time intervals.

Several programs aimed at the improvement of the sense of humor exist and they are applied, for example, in hospital, educational and counseling settings (see Nevo et al. 2007). They most often are based on the assumption that humor is a set of skills those typically are taught in group-settings during approximately 5 to 10 meetings. Few such programs underwent an evaluation though, and those who did yielded mixed results (Krantzhoff and

Hirsch 2001; Lowis and Nieuwoudt 1994). Lowis and Nieuwoudt (1994) published results from a workshop aimed at increasing humor usage as a coping aid. Twenty-two participants met for five sessions and the only significant change found was an increase in the Coping Humor Scale.

The most elaborate published evaluation study first designed a systematic program for the improvement of the sense of humor and then tested its effectiveness in a sample of 101 female high-school teachers (Nevo et al. 2007). The program consisted of 14 well-documented units, and the interventions were designed to specifically activate the proposed motivational, cognitive, emotional, and social components of sense of humor. One group received the full program, while another groups received only part of the program, and two others formed a control group or were only tested before and after. Results provide only partial support for the effectiveness of the program. While participants in the humor improvement program received higher peer-ratings of humor appreciation and humor production after the program (as in compared to rating before the program and compared to the control group), there were no differences in a variety of questionnaires or the humor production tests used.

McGhee (1999) developed a program that is both most explicit and theoretically founded. The program is based on the assumption that playfulness forms the basis for the sense of humor, and the rediscovery of a playful attitude or outlook on life (that got lost during education, school years and work) is a key element for change. The set of skills to be taught during group meetings and "home play" is distributed across eight steps ordered in difficulty from simple (e.g., enjoying humor in everyday life) to difficult (e.g., laughing at yourself) to acquire. Earlier steps need to be successfully mastered to finally be able to have access to humor skills in the midst of stress. To assess progress in the skills to be acquired the sense of humor scale (SHS; see Ruch and Carrell 1998, for a psychometric evaluation of the scale) is provided consisting of subscales that partly match these steps. Simone Sassenrath (2001) applied McGhee's program over a span of two month to four groups. She reports that the group of 20 adults that underwent the theoretical and practical part of the program (but not the three other groups) yielded increases in self-reports of humor, with some of those increases still prevailing one month after the end of the intervention. Changes involved increases in the six scales measuring the skills comprising the sense of humor, in playfulness, positive mood (subscales of the SHS), and the CHS, and also reductions in the seriousness and bad mood scales of the STCI. While both studies (Nevo et al. 2007; Sassenrath 2001) had a placebo control, the circumstances of the

studies did not allow for a random assignment of participants to groups. Heidi Stolz and Sandra Rusch (2008) were testing the eight-step-program in a sample of Swiss adults and yielded, among others, an increase in satisfaction with life in the experimental groups. While the participants were randomly assigned to the four groups, these were still differing in baseline levels and group dynamics.

While there is some preliminary evidence for effect of the intervention programs many issues remain unresolved. For example, the optimal length of such programs is not known. Also, what are the requirements on the leaders conducting the program (does anyone qualify?), who will likely profit from the course (everyone or specific groups?), what is expected to be improving (e.g., selective skills or the global sense of humor?). Do changes in the sense of humor occur, as McGhee would predict, when merely playfulness is nurtured but no humor skills are trained? Does a program for the training of the more humorless individuals need to be different from the one for the average person and the one with superior wit? Or is there no need to tailor it to the humor skills level of that group? Finally, one needs to consider broadening the goals of such programs. Humor may be used in destructive ways (as in put down witticisms). But when guided by benevolence, wisdom or transcendence, it may be used in virtuous ways to foster relationships, strengthen group morale, act as a social lubricant, promote intimacy, provide insight and facilitate the 'good life' generally. Therefore, programs might also want to incorporate the *unlearning* or refraining from destructive uses of humor, and we need studies examining whether the virtuous use of the humor skills can be learned as well.

Cross-national and cross-cultural perspectives

Already for a long time, people characterize their own group and their neighbors in terms of how much or what type of humor they supposedly possess. This took the form of regional differences (i.e., within countries) but also national differences (i.e., across countries). Usually more flattering forms of humor were attributed to themselves than to others (Eysenck 1944–1945; Nicholson 1946; Schmidt-Hidding 1963). Rarely, a country disliked by someone will be praised with much good humor. Having or not having a sense of humor is part of the national stereotype and may or may not go along with average scores of representative samples of citizens. In Europe, for example, chances are that Germans and English will turn out on opponent poles of

such scales, and many people in both countries seem to believe in those stereotypes (i.e., the postulated national character).

Irrespective of attributions of humor to certain countries, there may also be differences in humor existing in terms of mean levels of certain humor traits. Note again, that a psychological approach would not necessarily compare the humor material produced in two countries (i.e., studying the best 10 comic writings, Sit-coms, or joke collections) but the actual behavior of *people*. Differences in the type and quality of humor material produced in the countries may exist (especially as often the work of a limited number of writers comes to mind which may or may not be representative for the other citizens of that country) but it may well be that humor produced in one country is more highly appreciated in the other. Regional, cross-national or cross-cultural studies must take a different venue then, namely to study the humor of fairly representative (or at least comparable) samples from the entities to be compared. Such research has been done with other personality traits using translations of scales, and mean levels of representative groups from different cultures were compared quantitatively (e.g., McCrae and Allik 2002). Also, the factor structure of the scales is compared to see whether the scale is indeed applicable to the other country. This approach, however, has drawn extensive criticism, because raw scores obtained in different cultures, often from instruments in different languages, may not be directly comparable. Critics (e.g., Van de Vijver and Leung 1997) have pointed to a number of potential problems: Translations may not be equivalent, response styles may confound results, samples may not be representative of the culture as a whole etc.

Such research needs to be aware of the emic–etic distinction. *Emic* constructs are accounts, descriptions, and analyses expressed in terms of the conceptual schemes and categories that are regarded as meaningful and appropriate by the members of the culture under study. An emic construct is correctly termed “emic” if and only if it is in accord with the perceptions and understandings deemed appropriate by the insider’s culture. There is a vast amount of information on humor members of a society can share. The validation of emic knowledge thus becomes a matter of consensus – namely, the consensus of native informants, who must agree that the construct matches the shared perceptions that are characteristic of their culture.

Etic constructs are accounts, descriptions, and analyses expressed in terms of the conceptual schemes and categories that are regarded as meaningful and appropriate by the community of scientific observers. An etic construct is correctly termed “etic” if and only if it is in accord with the epistemological principles deemed appropriate by science (i.e., etic constructs must be pre-

cise, logical, comprehensive, replicable, falsifiable, and observer independent). The validation of etic knowledge thus becomes a matter of logical and empirical analysis – in particular, the logical analysis of whether the construct meets the standards of falsifiability, comprehensiveness, and logical consistency, and then the empirical analysis of whether or not the concept has been falsified and/or replicated.

Obviously humor research will profit from the acquisition of both emic and etic knowledge. Emic knowledge is essential for an intuitive and empathic understanding of the humor of a culture. Furthermore, emic knowledge is often a valuable source of inspiration for etic hypotheses. Etic knowledge is essential for cross-cultural comparison, because such comparison necessarily demands standard units and categories. Studies in folklore and anthropology, but also psychology have delivered emic and etic knowledge on humor (e.g., Apte 1985; Eysenck 1944–1945; Ferroluzzi-Eichinger 1997; Jones and Liverpool 1976; Ruch and Forabosco 1996).

There is a long-standing interest in comparing humor around the world (Davies 1990, 2007; Davis 2006; Ziv 1988). Actually, the *First International Conference on Humour and Laughter* in Cardiff, Wales, already had a symposium on cross-cultural aspects (see Chapman and Foot 1977). However, most of the research done involved emic description of national styles of humor, or comparing jokes found in folklore archives of different parts of the world. So far no comprehensive research program compared humor as an individual difference variable across several countries simultaneously. Ideally, the factor structure of a humor instrument would be examined for being universal across countries or not. Then means of the items that are comparable across countries would be used to derive mean profiles for the countries involved in the study. The differences in mean levels of humor then can be compared to other peculiarities of the country (again at the mean level), e.g., Hofstede's (2001) dimensions of culture, mean level of happiness (Diener and Suh 2000), personality dimensions (McCrae and Allik 2002), values (Schwartz 1992), or other information about the countries involved. For example, countries that are more conservative should show higher appreciation of incongruity-resolution humor; the countries' permissiveness might show a relationship with appreciation of sexual humor; or the level of conflict might relate to the use of humor as a coping mechanism. Not only the factor structure of humor tests might be compared across countries, also the typical personality correlates. For example, one might study whether the same personality traits that predict appreciation of sexual humor in Australia also are predictive in Scotland?

Indices describing differences among cultures exist. For example, Hofstede (2001) provided scores for five dimensions of culture: power distance (acceptance of status differences), uncertainty avoidance (preference for rules and routines to reduce stress), individualism (emphasis of self over family or group), masculinity (egoistic vs. social work goals), and long-term orientation (orientation towards future rewards). As cultures with high power distance appear to have members who are serious, traditional, task-minded workers, this dimension might be predictive of lower scores in some components of sense of humor.

A small-scale cross-cultural project was conducted for humor appreciation using the 3 WD humor test (Ruch 1992). The jokes and cartoons of the 3 WD were translated into different languages and typically administered to undergraduate student samples. Pair-wise comparisons between German data and the data from other countries (e.g., Austria, Canada, England, Germany, France, Italy, Israel Turkey, and USA) were undertaken and the factor structure turned out to be highly comparable (see Ruch, Accoce, Ott, and Bariaud 1991; Ruch and Forabosco 1996; Ruch and Hehl 2007). Likewise, funniness of nonsense is predicted by sensation seeking in Italy and Spain as it was in Germany, and the French conservatives enjoyed incongruity-resolution humor just like their German (and Italian, Turkish etc.) counterparts did (Carreteros-Dios and Ruch in press; Ruch et al. 1991; Ruch and Forabosco 1996). Comparison of means sometimes yielded surprising results; e.g., German students did appreciate nonsense humor more than the English sample did (although nonsense humor historically emerged in England first). This first pilot study was more aimed at estimating whether the factor structure would be comparable across countries and it is. Future studies should do a simultaneous comparison of the mean levels and compare those scores to other indices of the countries.

More recently, the fear of being laughed at was studied in different countries (Proyer et al. 2005). It turned out that this fear existed in each of the countries studied. Also the instrument (i.e., the GELOPH; Ruch and Proyer 2008a; Ruch and Proyer 2008b; Ruch and Titze 1998) appeared to be reliable irrespective of cultural variations. As there were systematic differences between the countries studied the project was subsequently expanded to include app. 80 nations filling in translations of the instrument into about 40 languages.

Furthermore, also different scales of sense of humor or humor styles (e.g., CHS, GELOPH, SHRQ, MSHS, HBQD, STCI-T) have been translated into other languages for use in research projects, and some byproducts of the

adaptation allow being interpreted. Typically, the factor structure, internal consistency and main correlates of those questionnaires were retained (e.g., Martin 1996; Chen and Martin 2007; Kazarian and Martin 2006; Thorson, Brdar, and Powell 1997), suggesting that also the questionnaire measures of humor may be comparable across nations. It might be of interest to do a more comprehensive comparison of humor across countries. However, studies of personality have shown that country does not account for more than 10 % of the variance in test scores; i.e. typically there is much more variation *within* countries than *between* them.

Heritability

Are humor and laughter innate or learned? Can anybody develop a sparkling wit or are some of us doomed to be and stay humorless? Is money and effort on “develop your sense of humor”-programs wasted or may everybody be trained to use humor in stressful situations? What is the etiology of the different forms of humor? Behavior genetics asks the extent to which differences in genetic differences among individuals contribute to the differences we observe in their behavior. This is the issue of nature and nurture and this question needs to be addressed by humor research as well.

Smiling and laughter are universal expressions (Darwin 1872) and there is evidence that man is not the only animal that laughs (Panksepp 2007; Preuschoft 1992; van Hoof 1972). While in ontogenetic development laughter emerges around the fourth month, the rare cases of *gelastic epilepsy* (from Greek; *gelos* = laughter) among neonates demonstrate that all structures are there and functional on date of birth (Wild et al. 2003). Further evidence for the innateness of laughter comes from early twin studies (Gedda and Neroni 1955) as well as from the fact that laughter was observed among deaf-blind children (even among deaf-blind thalidomide children, who could not “learn” laughter by touching people’s faces) (see Ruch and Ekman 2001).

Little is known about the heritability of the various components of humor. Two twin studies of appreciation of cartoon humor show no genetic influence for appreciation of nonsense, satirical, aggressive, and sexual cartoons (Cherkas, Hochberg, MacGregor, Snieder, and Spector 2000; Wilson, Rust, and Kasriel 1977). In both studies monozygotic twins were *not* more similar to each other than dizygotic twins. The high correlation among the twins (all reared together) shows that the shared environmental influence seems to be most relevant, followed by the non-shared (i.e., unique) environment. Thus,

familial and peer influences determine what we consider to be funny. This is noteworthy, as a finding of *no* genetic basis for a personality trait is the rare exception these days. Furthermore, the contents of humor (aggression, sex) and major predictors of humor appreciation (extraversion, conservatism, sensation seeking) are known to have a genetic basis.

However, it would be premature to conclude that humor appreciation is exclusively determined by environmental factors. We need further studies based on psychometrically sound tests of humor appreciation that utilize larger samples and more comprehensive humor scales. The study by Cherkas et al. (2000), for example, used only five cartoons. This is exactly the number of cartoons that seems to be affected by a “warm-up-effect”, contains state variance, and therefore are excluded from scoring in tests of humor appreciation (Ruch 1992). In a twin study of humor appreciation Weber, Ruch, Riemann, Spinath, and Angleitner (2008) administered the 3WD test to 135 monozygotic (MZ) and 60 dizygotic (DZ) twin pairs. The typical pattern emerged for the regular scores for funniness of nonsense and of sexual humor: there were contributions of shared and non-shared environment but no genetic effect. However, the separation of content and structure of funniness of sexual humor did yield a small genetic effect for appreciation of sexual content in humor.

Questionnaire studies of the frequency with which children use specific humor behaviors with their mothers, siblings, and friends (Manke 2007) and of a sense of humor rating (Loehlin and Nichols 1976) yield familiar results. There is a genetic influence of a moderate size and an effect of unique environment but no effect of shared (familial) environment. Non-adopted siblings were more similar in their humor use than adopted siblings (Manke 2007) and monozygotic twins rated their sense of humor more similar than dizygotic twins did. The heritability estimate was lower than for other personality traits but this might be due to the lower reliability of the scales. However, a more recent study of humor as character strength yielded no genetic effect (Steger, Hicks, Kashdan, Krueger, and Bouchard 2007).

No study exists for humor production or wit, or for more sophisticated and less behavioral forms of humor (e.g., a humorous outlook on life, not taking oneself too seriously, or what has been called philosophical humor). These more elusive forms of humor were often considered a to be sign of human maturity, an attitude akin to wisdom, and developed on prior suffering, pain, and exposure to an imperfect world and insight into the human nature. This would obviously allow expecting (non-shared) environmental effects. In any case, the etiology of the sense of humor will have to take both genetic and environmental factors into account.

If we find that the affect-based and behavioral forms (e.g., laughter, cheerfulness, social humor) are more strongly genetically determined than humor appreciation or a humorous attitude or humor as a virtue, we will have to examine whether the genetic factors involved are the same that are involved in positive affect or extraversion. Studies of the effects of family and peers will have to take a variety of factors into accounts (e.g., learning, models, imitation, life events). So far there is only anecdotal evidence that life events transform a person's humor as part of a general rearranging of priorities in life (e.g., through the insight that nothing earthly is infinite, typically following a painful loss). Too few intervention studies were conducted and the existing ones do not yield clear results. Therefore, nothing much can be said about the relative contributions of genes and environment on the different components of humor at this stage. Also, we need more studies on humor and assortative mating (Murstein and Brust 1985; Priest and Thein 2003).

Evolution of humor and laughter

Evolutionary psychology asks the question of how traits have evolved over species. Psychologists and ethologists asked the question of what is the reproductive significance of humor? Knowing the origins of humor and laughter would help understanding their present status; i.e., facilitate deriving hypotheses about people's current behavior and make predictions in current studies more successful. However, *vice versa*, speculation about evolutionary origins would be facilitated if we knew more about the current functions of humor and laughter, what their antecedents and consequences are, what changes there are from pre to post when humor and laughter occur. We mostly lack this knowledge. Also, we have not yet established a complete net of the humor-related variables, which would help determining what later forms build upon which earlier ones.

While smiling and laughter are recognized as universal and innate expressions, the status of the emotion of amusement (or mirth, hilarity) is less clear. Van Hoof (1972) demonstrated that smiling and laughter have a different phylogenetic development. However, Darwin proposed that laughter preceded smiling. While it seems likely that all humans are capable of the perception that something is funny, the pertinent research is still missing. If one takes appreciation of jokes and cartoons as an index of humor appreciation the situation is somewhat mixed. Research with the 3 WD humor test shows some evidence for cross-cultural stability of factors of incongruity-resolution

humor and nonsense humor at least in several Western cultures. However, the Cherkas et al. (2000) twin study of Gary Larson humor (a good marker of nonsense humor) does not yield any genetic effect and also the study by Wilson et al. (1977) seems to suggest only the involvement of environmental factors. Surely, jokes and cartoons do not exist long enough to be of evolutionary relevance, but it is reasonable to assume that humans were able to appreciate humor (in whatever precursor) long before jokes and cartoons emerged. Therefore, it seems to make sense that humor appreciation (as a form of aesthetic experience) was included in speculations about evolutionary origins as well. Definitely, humor creation, or wit, would be a good candidate for evolutionary speculation, but no genetic study has been conducted yet and we know less about production of humor than about appreciation of humor. Wit and appreciation of nonsense humor are indeed correlated to intelligence, which may be seen as an indicator of fitness. The use of humor and the sense of humor (as assessed by self-reports) have been demonstrated to have some genetic basis.

Studies of humor in apes show reactions that are very similar to laughter and smiling in humans (Darwin 1872; van Hoof 1972). Apes do not only show smiling and laughter and positive emotion in response to tickling and social play (McGhee 1979), they also seem to be able to recognize incongruities when using objects (Gamble 2001). Recently, it has been discovered that rats show play- and tickle-induced ultrasonic vocalization patterns inaudible for humans that resembles primitive human laughter neurally and that are functionally homologous (Panksepp 2007; Panksepp and Burgdorf 2003).

In humans, laughter emerges early in life. Not only do infants begin to laugh in response to social stimuli as early as at the age of about four months (Sroufe and Waters 1976), but also children born blind and deaf laugh normally (Goodenough 1932). As shown by gelastic epilepsy in newborns, mechanisms of laughter seem to be present at birth already (Sher and Brown 1976).

Such evidence points towards the evolutionary basis of laughter and humor. However, the question is, why human beings developed their ability to humor. What was the reproductive significance of humor, amusement and laughter? Several ideas about their adaptive value have been proposed (for reviews, see Caron 2002; Gervais and Wilson 2005; Jung 2003; Vaid 1999). While some were more particularistic and restricted in scope, others proposed unitary explanation of the function of humor that would explain laughter at tickling and other forms of social play, at pratfalls and other forms

of physical humor, and at verbal and nonverbal witticisms (Alexander 1986, Weisfeld 1993).

For example, humor has been seen as a friend or foe system (Hewitt 2002), or laughter as an aggressive activity of several group members with which they threaten a common enemy (Eibl-Eibesfeldt 1989). The evolutionary origins of humor and laughter have been explained with ‘the inner eye theory of laughter’ (Jung 2003), the mind reading hypothesis (Howe 2002) or as evolved as a mode of communication distinct from the serious mode (Mulkay 1988). Humor is seen as ‘social stimulation’ (Weisfeld 1993, 2006), as a ‘status manipulation’ (Alexander 1986) or a disabling mechanism (Chafe 1987, 2007). Other approaches are the false alarm theory (Ramachandran 1998), a rediscovery of Hayworth (1928), or the ‘selfish-gene’ account of smiling and laughter (Owren and Bachorowski 2001). Finally, humor is seen as a vocal grooming (Dunbar 1996), a ‘fitness indicator’ signaling ‘good genes’ (Miller 2000), and as sexually specifically selected based on male’s and female’s different preferences during humorous interaction (Bressler, Martin and Balshine 2006). Gervais and Wilson (2005) present an integrative approach stretching the significance of the distinction between Duchenne and non-Duchenne laughter for the explanation of the evolutionary origins of laughter and humor.

Notes

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